JVC

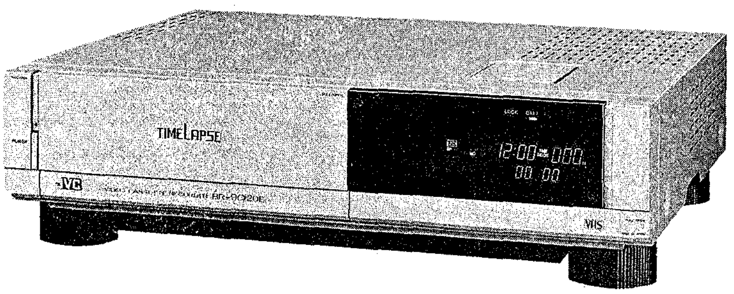
# SERVICE MANUAL

## TIME LAPSE VIDEO CASSETTE RECORDER

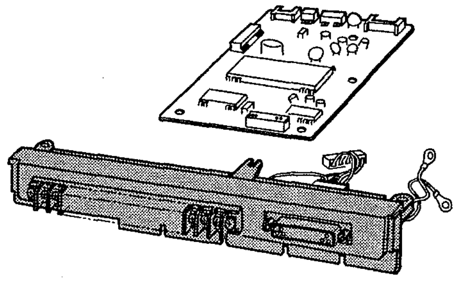
# BR-9020E/SA-K90E

## [RS-232C INTERFACE BOARD]

– BR-9020E –



– SA-K90E –



## SPECIFICATION

**GENERAL**

| | |
|---|---|
| Power requirement | : AC 220 — 240 V, 50/60 Hz |
| Power consumption | : 34 W |
| Dimensions | : 435 (W) X 124 (H) X 375 (D) mm |
| Weight | : Approx. 8.0 kg |
| Temperature | |
| Operating | : 5°C to 40°C |
| Storage | : –20°C to 60°C |
| Operating humidity | : 30% to 80% |
| Format | : VHS PAL standard |
| Tape speed | : 23.39 mm/sec (SP, TL),<br>11.70 mm/sec (LP) |
| Recording and playback time | : 3 (VHS SP), 6 (VHS LP), 24, 48, 72, 120, 168, 240, 480, 960 hours (with E-180/ cassette) |

**VIDEO**

| | |
|---|---|
| Signal system | : PAL-type colour signal |
| Recording system | |
| Luminance | : FM recording |
| Colour | : Down-converted direct recording |
| Input Line | : 0.5 to 2.0 Vp-p, 75 ohms, unbalanced |
| Output Line | : 1.0 Vp-p, 75 ohms, unbalanced |
| Horizontal resolution | : 240 lines (colour)<br>300 lines (monochrome) |
| Signal-to-noise ratio | : 43 dB |

**AUDIO**

| | |
|---|---|
| Number of tracks | : 1 |
| Input | : –8 dBs, unbalanced |
| Output | : –6 dBs, unbalanced |
| Frequency response | : 100 Hz to 8 kHz |
| Signal-to-noise ratio | : 40 dB (SP at 3% distortion) |
| Wow and flutter | : Less than 0.35% RMS |

**TIME/DATE GENERATOR**

| | |
|---|---|
| Display | : Day, month, year, hours, minutes, seconds, recording mode |
| Character size | : 16 H |
| Power back up | : Approx. one year |

**ALARM**

| | |
|---|---|
| Alarm input | : Ground input |
| Alarm output | : Alarm input throughout |
| Camera switching output | : Negative pulse output (approx. 5 msec.) |

**SERIES RECORDING**

| | |
|---|---|
| Series input | : Ground input, RCA |
| Series output | : Series input, RCA |

**ACCESSORIES**

| | |
|---|---|
| Provided accessories | : "R6/AA/UM-3" battery X 3<br>Power cord X 1 |

*E. & O.E. design and specifications subject to change without notice.*

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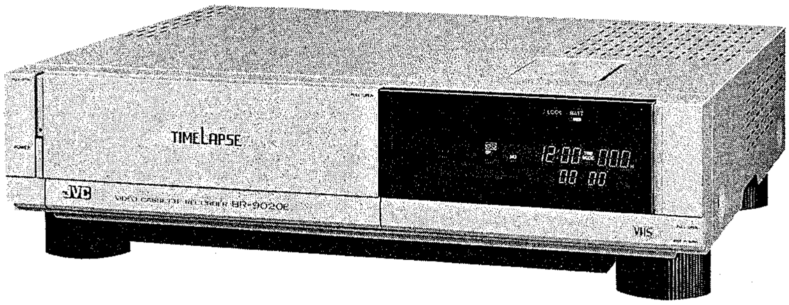
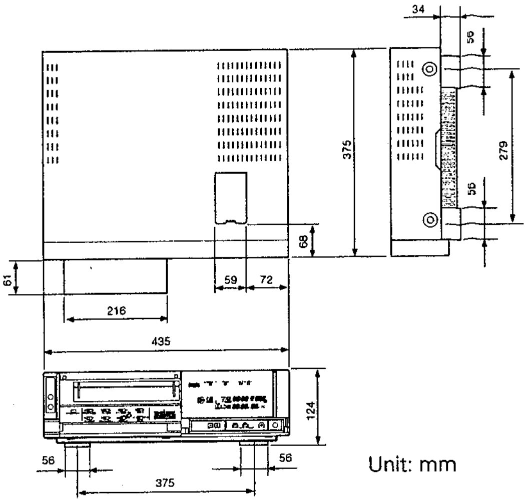
**No. 9302**
**January 1995**

# TIME LAPSE
# VIDEO CASSETTE RECORDER

## BR-9020E





Unit: mm

VHS
PAL

## SPECIFICATION

### GENERAL

| | | |
|---|---|---|
| Power requirement | : | AC 220 — 240 V, 50/60 Hz |
| Power consumption | : | 34 W |
| Dimensions | : | 435 (W) X 124 (H) X 375 (D) mm |
| Weight | : | Approx. 8.0 kg |
| Temperature | | |
| Operating | : | 5°C to 40°C |
| Storage | : | –20°C to 60°C |
| Operating humidity | : | 30% to 80% |
| Format | : | VHS PAL standard |
| Tape speed | : | 23.39 mm/sec (SP, TL),<br>11.70 mm/sec (LP) |
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| Recording system | | |
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| Input Line | : | 0.5 to 2.0 Vp-p, 75 ohms, unbalanced |
| Output Line | : | 1.0 Vp-p, 75 ohms, unbalanced |
| Horizontal resolution | : | 240 lines (colour)<br>300 lines (monochrome) |
| Signal-to-noise ratio | : | 43 dB |

### AUDIO

| | | |
|---|---|---|
| Number of tracks | : | 1 |
| Input | : | –8 dBs, unbalanced |
| Output | : | –6 dBs, unbalanced |
| Frequency response | : | 100 Hz to 8 kHz |
| Signal-to-noise ratio | : | 40 dB (SP at 3% distortion) |
| Wow and flutter | : | Less than 0.35% RMS |

### TIME/DATE GENERATOR

| | | |
|---|---|---|
| Display | : | Day, month, year, hours, minutes, seconds, recording mode |
| Character size | : | 16 H |
| Power back up | : | Approx. one year |

### ALARM

| | | |
|---|---|---|
| Alarm input | : | Ground input |
| Alarm output | : | Alarm input throughout |
| Camera switching output | : | Negative pulse output (approx. 5 msec.) |

### SERIES RECORDING

| | | |
|---|---|---|
| Series input | : | Ground input, RCA |
| Series output | : | Series input, RCA |

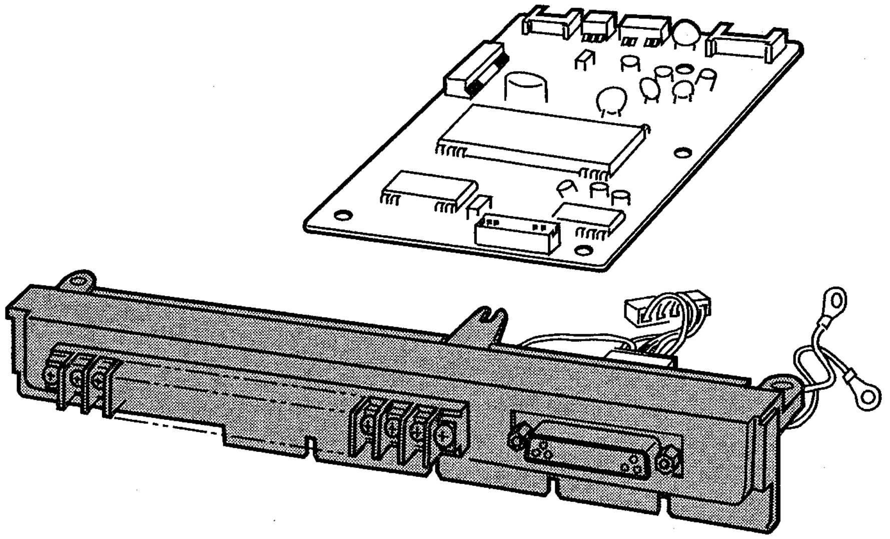
### ACCESSORIES

| | | |
|---|---|---|
| Provided accessories | : | "R6/AA/UM-3" battery X 3<br>Power cord X 1 |

*E. & O.E. design and specifications subject to change without notice.*

# RS-232C INTERFACE BOARD

## SA-K90E



## SPECIFICATION

**•RS-232C 25-PIN SERIAL REMOTE CONTROL INTERFACE**

| pin No. | Signal | Subject | Direction of signals |
|---|---|---|---|
| 1 | FG | FRAME GROUND | |
| 2 | TXD | TRANSMIT DATA | VCR → COMPUTER |
| 3 | RXD | RECEIVE DATA | VCR ← COMPUTER |
| 6 | DSR | DATA SET READY | VCR ← COMPUTER |
| 7 | GND | SIGNAL GROUND | |
| 20 | DTR | DATA TERMINAL READY | VCR → COMPUTER |

Use cross-type cable for connection with a computer.

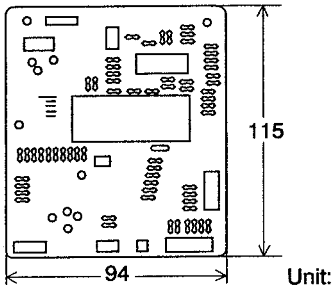
Output level- ON : more than +5V
OFF : less than -5V

DATA FORMAT
Mode : Non-synchronised
Charactor length : 8 bits
Parity check : None
Stop bit : 1 bit
Data rate : 600,1200,2400,4800,9600 bps
(Selectable with DIP switch setting. See page 6)

**•Power consumption** ........................................ **0.5W**
**•Allowable operating temperatures** ............. **5°C~40°C**
**•Allowable storage temperatures** ................. **–20°C~60°C**
**•Allowable operating humidities** .................. **30%~60%**

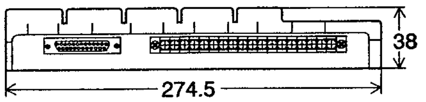
**External dimensions**

RS-232C Board assembly



Unit: mm

TERMINAL Board assembly



Unit: mm

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SC-00-0083

# JVC Service Bulletin

| Model | Service Manual No. | Performed at factory : | Reference Information |
|---|---|---|---|
| BR-S925U<br>BR-9020E | No. 9283<br>No. 9302 | | |

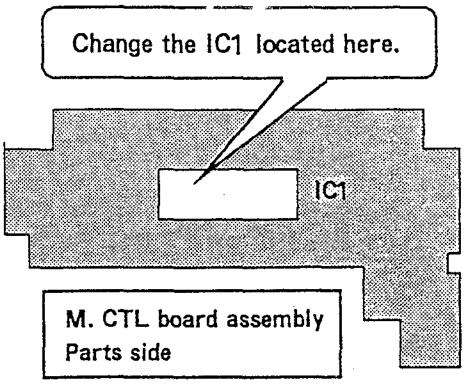
**SUBJECT :** The tape cannot be ejected. **DATE** : 20, Dec., 1996

**SYMPTOM** : The tape is intermittently unable to be ejected when the built-in timer recording and the sensor recording functions are used simultaneously.

**CAUSE** : When the sensor recording is started from the standby function after timer recording, a defect in the mechanism control software causes an excessive rotation of the mode motor, which causes the mechanism to be locked.

**CHANGES** : Change the ROM IC in the mechanism controller as shown below.

| Loading | Ref. No. | Model | Original Part No. | New Part No. | Part Name |
|---|---|---|---|---|---|
| <07> M.CTL board assembly | IC1 | BR-S925U | M37524M5-210SP | M37524M5-227SP | IC |
| | | BR-9020E | M37524M4-320SP | M37524M4-321SP | |



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# Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

## ● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the ⚠ symbol and shaded (▨) parts are critical for safety.
   Replace only with specified part numbers.
   Note: **Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.**

3. Fuse replacement caution notice.
   Caution for continued protection against fire hazard.
   Replace only with same type and rated fuse(s) as specified.

4. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads

5. Use specified insulating materials for hazardous live parts. Note especially:

| | | |
|---|---|---|
| 1) Insulation Tape | 3) Spacers | 5) Barrier |
| 2) PVC tubing | 4) Insulation sheets for transistors | |

6. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

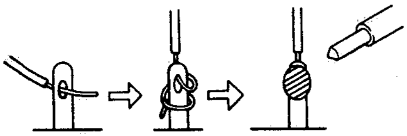


**Fig. 1**

7. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

8. Check that replaced wires do not contact sharp edged or pointed parts.

9. When a power cord has been replaced, check that 10–15 kg of force in any direction will not loosen it.

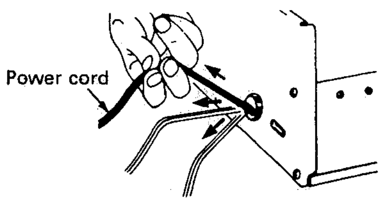


**Fig. 2**

10. Also check areas surrounding repaired locations.

11. Products using cathode ray tubes (CRTs)
    In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

12. Crimp type wire connector
    In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.
    1) **Connector part number** : E03830-001
    2) **Required tool** : Connector crimping tool of the proper type which will not damage insulated parts.
    3) **Replacement procedure**
       (1) Remove the old connector by cutting the wires at a point close to the connector.
       Important : Do not reuse a connector (discard it).

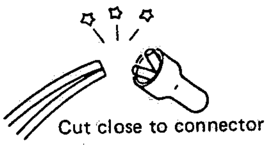


**Fig. 3**

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

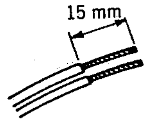


**Fig. 4**

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

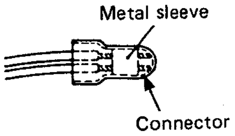


**Fig. 5**

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

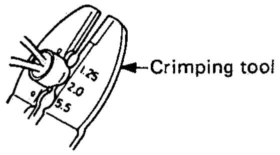


**Fig. 6**

(5) Check the four points noted in Fig. 7.

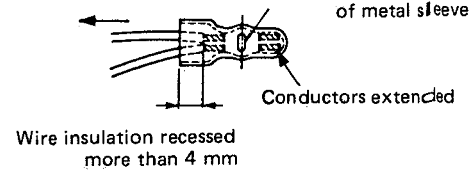

Not easily pulled free
Crimped at approx. center of metal sleeve
Conductors extended
Wire insulation recessed more than 4 mm

**Fig. 7**

# • Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions, Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. **Insulation resistance test**
   Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

2. **Dielectric strength test**
   Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

3. **Clearance distance**
   When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

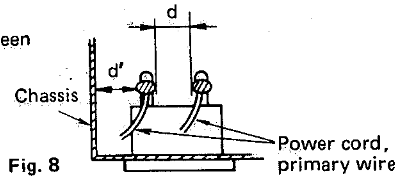


**Fig. 8**

4. **Leakage current test**
   Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).
   **Measuring Method:** (Power ON)
   Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.

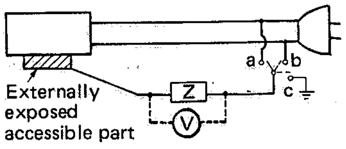


**Fig. 9**

5. **Grounding (Class I model only)**
   Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).
   **Measuring Method:**
   Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.

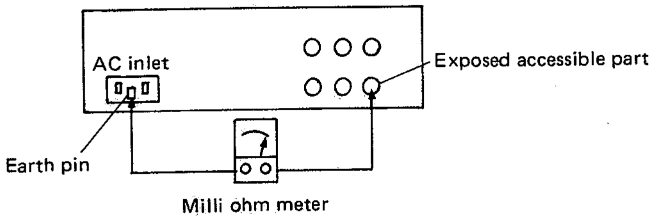


**Fig. 10**

**Grounding Specifications**

| Region | Grounding Impedance (Z) |
|---|---|
| USA & Canada | Z ≦ 0.1 ohm |
| Europe & Australia | Z ≦ 0.5 ohm |

| AC Line Voltage | Region | Insulation Resistance (R) | Dielectric Strength | Clearance Distance (d), (d') |
|---|---|---|---|---|
| 100 V | Japan | R ≧ 1 MΩ/500 V DC | AC 1 kV 1 minute | d, d' ≧ 3 mm |
| 100 to 240 V | | | AC 1.5 kV 1 minute | d, d' ≧ 4 mm |
| 110 to 130 V | USA & Canada | — | AC 900 V 1 minute | d, d' ≧ 3.2 mm |
| 110 to 130 V<br>200 to 240 V | Europe & Australia | R ≧ 10 MΩ /500 V DC | AC 3 kV 1 minute (Class II)<br>AC 1.5 kV 1 minute (Class I) | d ≧ 4 mm<br>d' ≧ 8 mm (Power cord)<br>d' ≧ 6 mm (Primary wire) |

**Table 1** Specifications for each region

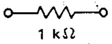
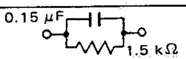
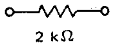
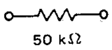
| AC Line Voltage | Region | Load Z | Leakage Current (i) | a, b, c |
|---|---|---|---|---|
| 100 V | Japan |  1 kΩ | i ≦ 1 mA rms | Exposed accessible parts |
| 110 to 130 V | USA & Canada |  0.15 μF<br>1.5 kΩ | i ≦ 0.5 mA rms | Exposed accessible parts |
| 110 to 130 V<br>220 to 240 V | Europe & Australia |  2 kΩ | i ≦ 0.7 mA peak<br>i ≦ 2 mA dc | Antenna earth terminals |
| | |  50 kΩ | i ≦ 0.7 mA peak<br>i ≦ 2 mA dc | Other terminals |

**Table 2** Leakage current specifications for each region

**Note:** These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

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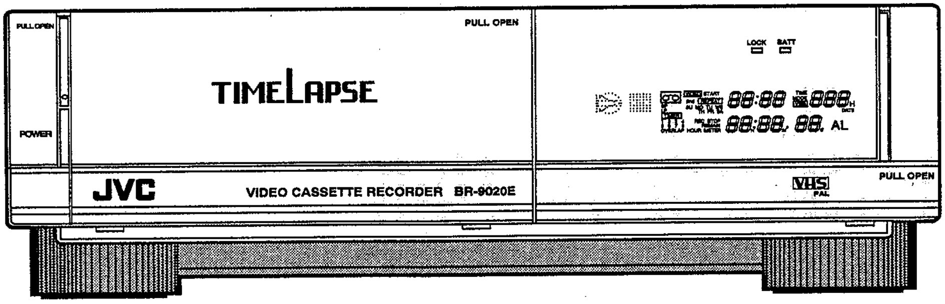
INSTRUCTIONS

JVC

# BR-9020E

## TIMELAPSE VIDEO CASSETTE RECORDER
## LANGZEIT-VIDEOREKORDER
## MAGNETOSCOPE A CASSETTE A LAPS DE TEMPS

VHS
PAL


PULL OPEN
PULL OPEN
POWER
TIMELAPSE
LOCK
BATT
88:88
888
88:88.
88.
AL
JVC
VIDEO CASSETTE RECORDER BR-9020E
VHS
PAL
PULL OPEN

SL-96003

# SAFETY PRECAUTIONS

**Warning Notice**
**FOR YOUR SAFETY (Australia)**

1. Insert this plug only into effectively earthed three-pin power outlet.
2. If any doubt exists regarding the earthing, consult a qualified electrician.
3. Extension cord, if used, must be three-core correctly wired.

**IMPORTANT (In the United Kingdom)**
**Mains Supply (AC 230 V ∿)**
**WARNING – THIS APPARATUS**
**MUST BE EARTHED**

The wires in this mains lead are coloured in accordance with the following code;

GREEN-and-YELLOW: EARTH
BLUE: NEUTRAL
BROWN: LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows.

The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked with the letter E or by the safety earth symbol ⏚ or coloured GREEN or GREEN-AND-YELLOW. The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or which is coloured BLACK. The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

**POWER SYSTEM**
**Connection to the mains supply**
This unit operates on voltages of 220 to 240 V AC, 50/60 Hz.

This unit is produced to comply with Directives 76/889/EEC, 82/499/EEC, 87/308/EEC, and IEC Publ.65.

**WARNING:**
**TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.**

**CAUTION**
To prevent electric shock, do not open the cabinet. No user serviceable parts inside. Refer servicing to qualified service personnel.

**Note:**
The rating plate and the safety caution are on the rear of the unit.

**WARNING**
It should be noted that it may be unlawful to re-record pre-recorded tapes, records, or discs without the consent of the owner of copyright in the sound or video recording, broadcast, or cable programme and in any literary, dramatic, musical or artistic work embodied therein.

## CONFIDENTIAL

This page contains information that should be kept confidential. Please detach and keep in a safe place.

**Operation Lock**
To prevent unauthorised operation or tampering, you can lock the recorder in its current mode and render all controls inoperative.

1. Set the recorder for operation in the Record or Play mode.
2. Pull open the panel on the left (labelled "POWER").
3. Press the TIMELAPSE MODE + button while pressing the OPERATION LOCK button.
   - The LOCK indicator will light.
   - The recorder's controls are locked. Operation will continue in the present mode until the lock function is disengaged or the tape ends. After operation stops, the controls will remain locked.
4. To disengage the lock function, press the OPERATION LOCK and TIMELAPSE MODE + buttons simultaneously.

**Alarm/Power loss memory resetting**
To reset the alarm/power loss memory, press the ALARM/PL RESET button once. (Press the button twice if the "AL" indicator is lit.) All alarm and power loss data will be cleared.

## VERTRAULICH

Diese Seite enthält vertrauliche Informationen. Sie sollten diese Seite daher heraustrennen und an einem sicheren Ort aufbewahren.

**Sperrschalter**
Um diesen Rekorder vor unbefugter Handhabung zu schützen, kann die eingestellte Betriebsart verriegelt werden. Hierbei sind alle Bedienungselemente abgeschaltet.

1. Den Rekorder auf Wiedergabe oder Aufnahme schalten.
2. Die links befindliche, mit POWER bezeichnete Klappe öffnen.
3. Bei gedrückt gehaltener OPERATION LOCK-Taste die TIMELAPSE MODE-Taste + drücken.
   - Die LOCK-Anzeige leuchtet.
   - Alle Rekorder-Bedienungselemente sind gesperrt. Die eingestellte Funktion wird beibehalten, bis die Sperrfunktion wieder abgeschaltet bzw. bis das Bandende erreicht wird. Auch nach vollständiger Funktionsausführung bleiben alle Bedienungselemente gesperrt.
4. Zur Abschaltung der Sperrfunktion gleichzeitig die OPERATION LOCK-Taste und die TIMELAPSE MODE-Taste + drücken.

**Alarm/Stromausfall-Speicher-Rückstellung**
Zur Rückstellung des Alarm/Stromausfall-Speichers die ALARM/PL RESET-Taste einmal drücken. (Bei leuchtender AL-Anzeige diese Taste zweimal drücken.) Alle Alarm- und Stromausfalldaten werden gelöscht.

## CONFIDENTIEL

Cette page contient des informations qui doivent rester confidentielles. Veuillez la détacher et la garder dans un endroit sûr.

**Verrouillage du fonctionnemant**
Pour éviter une utilisation ou des altérations non autorisées, vous pouvez verrouiller le magnétoscope dans son mode actuel et rendre toutes les commandes inutilisables.

1. Régler le magnétoscope pour le fonctionnement en mode d'enregistrement ou de lecture.
2. Ouvrir complètement le panneau de gauche (étiqueté "POWER").
3. Appuyer sur la touche TIMELAPSE MODE + tout en appuyant sur la touche OPERATION LOCK.
   - L'indicateur LOCK s'allumera.
   - Les commandes du magnétoscope sont verrouillées. Le fonctionnement continuera dans le mode actuel jusqu'à ce que la fonction de verrouillage soit désactivée ou quand la bande se termine. Une fois le fonctionnement arrêté, les commandes restent verrouillées.
4. Pour désactiver la fonction de verrouillage, presser les touches OPERATION LOCK et TIMELAPSE MODE + simultanément.

**Remise à zéro de la mémoire d'alarme/perte d'alimentation**
Pour réinitialiser la mémoire d'alarme/perte d'alimentation, presser une fois la touche ALARM/PL RESET. (Presser deux fois la touche si l'indicateur "AL" est allumé.) Toutes les données d'alarme et de perte d'alimentation seront annulées.

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# PRECAUTIONS

## VCR

- Avoid using the recorder in places subject to the following conditions:
  - extreme heat, cold, or humidity,
  - dust,
  - near appliances generating strong magnetic fields,
  - vibrations, and
  - poor ventilation.
- Be careful of moisture condensation.
  Do not use the recorder immediately after moving it from a cold place to a warm place. The water vapour in warm air will condense on the still-cold video head drum and tape guides and may cause damage to the tape and the recorder.
- Handle the recorder carefully.
  - Do not block the ventilation openings.
  - Do not place anything heavy on the recorder.
  - Do not place anything which might spill on the top cover of the recorder.
  - Use in horizontal (flat) position only.
- During transportation,
  - Avoid violent shocks to the recorder during packing and transportation.
  - Before packing, be sure to remove the cassette from the recorder.

## VIDEO CASSETTES

- This recorder uses VHS cassettes.
- Do not use tapes that are longer than the E-180.
- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or magnet) and dusty places.
- Place the cassettes in cassette cases and position vertically.

## DAILY CHECK

For smooth, trouble-free operation, check the recorder every day to make sure that it's working properly.

- Make sure the input signal is clear and stable. Record the signal and play it back to confirm that the recording system is in good working order.
  To quickly check recording conditions, press the REC CHECK button during recording.
- Check the alarm recording switch by tripping an alarm sensor. Verify that alarm recording takes place.
- Make sure that the wiring to each alarm sensor or camera (with alarm sensors) is undamaged. Trip each alarm sensor in succession and confirm that the sensor activates the alarm and puts the recorder in the Alarm Record mode.

## AVAILABLE RECORDING TIMES

- Selectable with the TIMELAPSE MODE +/– buttons.
- Available recording times may vary with different tapes.

| Display | Mode | Recording time | | | | | Recording/ playback interval | Audio recording |
|---|---|---|---|---|---|---|---|---|
| | | E-30 | E-60 | E-90 | E-120 | E-180 | | |
| 000 H | One-shot | — | — | — | — | — | Max. 3 min | No |
| 003 H | VHS SP | 30 min | 1 hour | 1 h 30 min | 2 hours | 3 hours | — | Yes |
| 006 H | VHS LP | 1 hour | 2 hours | 3 hours | 4 hours | 6 hours | — | |
| 024 H | TL/24 | 4 hours | 8 hours | 12 hours | 16 hours | 24 hours | 0.16 sec | No |
| 048 H | TL/48 | 8 hours | 16 hours | 24 hours | 32 hours | 48 hours | 0.32 sec | |
| 072 H | TL/72 | 12 hours | 24 hours | 36 hours | 48hours | 72 hours | 0.48 sec | |
| 120 H | TL/120 | 20 hours | 40 hours | 60 hours | 80 hours | 120 hours | 0.8 sec | |
| 168 H | TL/168 | 28 hours | 56 hours | 84 hours | 112 hours | 168 hours | 1.12 sec | |
| 240 H | TL/240 | 40 hours | 80 hours | 120 hours | 160 hours | 240 hours | 1.6 sec | |
| 480 H | TL/480 | 80 hours | 160 hours | 240 hours | 320 hours | 480 hours | 3.2 sec | |
| 960 H | TL/960 | 160 hours | 320 hours | 480 hours | 640 hours | 960 hours | 6.4 sec | |

# FEATURES

**Recording mode flexibility**
Recording is possible for up to 960 hours (40 days) in the timelapse mode, with recording times also selectable from 24, 48, 72, 120, 168, 240, and 480 hours. You can choose a recording time to suit virtually any situation whether it's for a bank demanding 7-day coverage (168-hour mode) or a manufacturing operation closed down for the summer holidays (480/960-hour mode). Timelapse playback circuitry is also provided. For special requirements, one-shot field recording is possible with user-designated durations. Added versatility is provided by 14-day/8-event timer recording capability. This can be used in combination with timelapse recording to give you automatic coverage at specified times on a daily or weekly basis. For even greater flexibility, you can preset the recorder not to record on specified dates.

**Alarm recording with alarm/power-loss memory**
For greater reliability, the BR-9020E features advanced alarm recording and alarm search capabilities. Whenever an alarm signal is received, the pre-selected VHS Standard (SP) or Long Play (LP) continuous record mode is automatically activated for uninterrupted real-time recording of the alarm situation. To enable easy, high-speed retrieval of each alarm recording, VISS index codes are automatically recorded on the tape whenever alarm recording starts. Recording time per alarm is selectable from 5 seconds, 10 seconds, 15 seconds, 30 seconds, 60 seconds, 180 seconds, to tape end, or for the duration of alarm signal input. Reliability is further enhanced by a 999-event alarm memory and 99-event power-loss memory with exact time and date available for the first recorded incident, as well as the last three. This data will help you pinpoint peak problem periods and can be checked at any time by calling up the on-screen display.

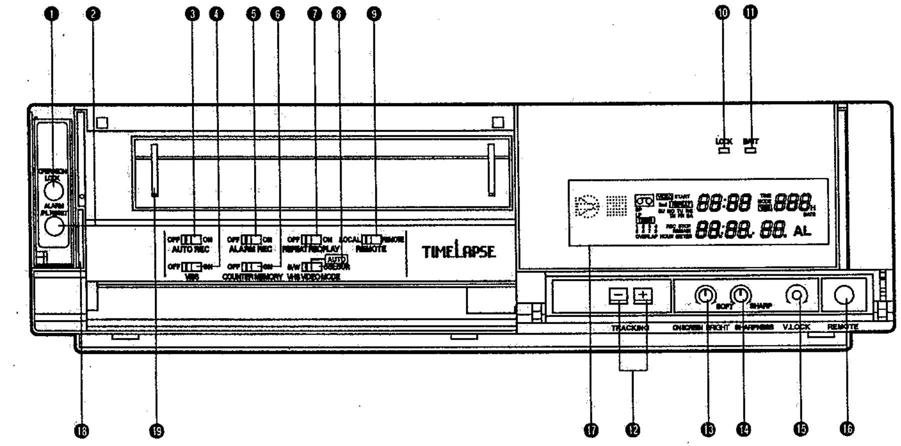
**Other Features**
- On-screen setup menu and mode display
- Sensor recording function
- Series recording capability
- Recording check function for instant playback quality check during recording
- Auto head-cleaning mechanism
- Advanced mode lock system
- Time/date generator with position control and power backup
- Summer time compensation function
- Camera switching signal output with selectable intervals
- Clock calibration terminals for automatic adjustment of all connected VCR clocks to precisely the same time
- Video mode select switch
- Auto-repeat recording and playback
- Still and field advance
- Shuttle Search
- Reverse, double-speed, and timelapse mode playback
- Auto-reset recording after power failure
- Front panel cover to protect cassette slot and controls from the environment
- Digital hour meter up to 9999 hours
- Electronic buzzer to signal start of alarm recording
- Electronic buzzer for tape-end warning
- Through output of EE input with power off (composite video signal only)
- Wired remote control (optional)

## OPTIONAL RS-232C INTERFACE BOARD (SA-K90E)

With the optional RS-232C interface board (SA-K90E) in the BR-9020E, direct interface with a personal computer is possible. This permits easy incorporation in a centralised security system and makes possible more precise programming of timelapse mode switching.

# CONTROLS AND CONNECTORS

## FRONT PANEL



① **OPERATION LOCK button**

② **ALARM/PL RESET button**

③ **AUTO REC switch**

ON: To automatically restart recording when power is restored after a power failure. Also set to this position when recording with an external timer.

OFF: To disable automatic recording function. To avoid accidental erasure of recorded tapes, be sure to set to this position if you don't require automatic recording.

④ **VISS (VHS Index Search System) switch**

ON: To automatically locate recorded index codes in the Rewind or Fast-Forward mode. When used with alarm-recorded tapes, the beginning of the nearest alarm recording is located.

OFF: Normally set to OFF.

**Note:**

- This function will not operate during rewind in Auto Rewind mode and Repeat Recording/Playback mode.

⑤ **ALARM REC switch**

ON: To switch from the timelapse recording mode to the 3-hour (VHS SP) or 6-hour (VHS LP) recording mode when an alarm signal is input. Alarm recording duration can be selected from 5 sec., 10 sec., 15 sec., 30 sec., 60 sec., 180 sec., to tape end, or for the duration of alarm signal input.

OFF: To continue recording in the same mode when an alarm signal is input.

⑥ **COUNTER MEMORY switch**

ON: *Tape automatically stops at counter reading zero in the Rewind or Fast Forward mode.*

OFF: *To defeat counter memory function.*

**Note:**

- The counter memory does not function when the next-function memory, repeat recording/playback, or VISS index search is in use.

⑦ **REPEAT REC/PLAY switch**

ON: To repeat recording or playback. When the end of the tape is reached, the tape is rewound to the beginning and recording or playback automatically restarts.

OFF: No repeat operation.

⑧ **VHS VIDEO MODE select switch**

This applies to both recording and playback.

COLOUR: Set to this position when the input or playback video signal is in colour.

AUTO: Set to this position for automatic switching between colour and black/white modes according to the type of signal. Normally set to this position.

B/W: Set to this position when the input or playback video signal is monochrome.

**Note:**

- When monochrome video signals are reproduced in the Still mode with this switch set to AUTO, colour noise may appear. In this case, set the switch to B/W.

⑨ **REMOTE/LOCAL select switch**

LOCAL: Set to this position to control the recorder with its own function buttons. Operation via a connected remote control unit or computer is not possible.

REMOTE: Set to this position to control the recorder via a connected remote control unit or computer. (The recorder's function buttons can still be used when *the switch is set to this position.)*

⑩ **LOCK indicator**

- Lights when the Operation Lock mode is engaged.

⑪ **BATTERY indicator**

- Lights if no TDG backup batteries have been installed.
- Lights when TDG backup battery power drops to a level requiring replacement. Replace the backup batteries with new R6/AA/UM-3 batteries.

⑫ **TRACKING (+/–) buttons**

- To adjust tracking to minimise noise bars in playback picture.
- Press both buttons simultaneously to reset tracking to normal.
- Tracking is automatically reset when a cassette is ejected or the power is switched off.

⑬ **ON SCREEN BRIGHT control**

- To adjust brightness of time/date characters superimposed on the picture. Turn clockwise to increase brightness, and counterclockwise to reduce brightness.

⑭ **SHARPNESS control**

- Turn for a softer or sharper playback picture.

⑮ **V-Lock control**

- Using a screwdriver turn to eliminate vertical jitter in still and timelapse playback pictures.

⑯ **REMOTE terminal (RCA)**

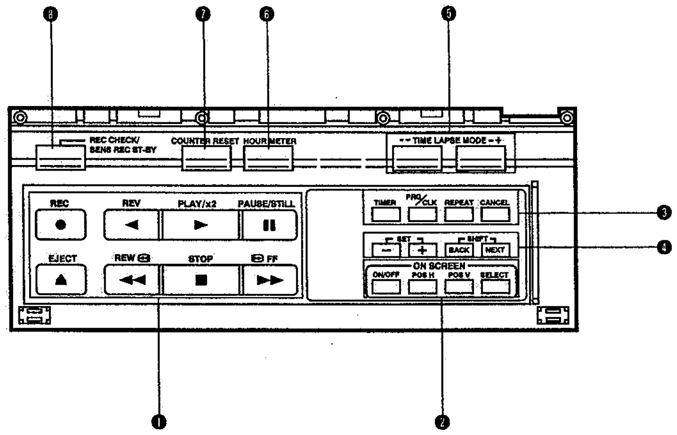
- Connect the optional remote control unit (RM-G30U) to this terminal.

⑰ **FDP (Fluorescent Display Panel)**

⑱ **POWER button with LED indicator**

⑲ **Cassette loading slot**

## FOLDOUT CONTROL PANEL



❶ **Operation buttons**

REV button
- Starts reverse playback at normal speed.

REC button
- Starts recording.
- Activates the off-timer when pressed in the Record mode. (☞ p. 27)

EJECT button
- Ejects the cassette.

REW button
- Starts tape rewind when pressed in the Stop mode.
- Starts high-speed reverse shuttle search when pressed in the Play mode.
- Starts alarm search in the reverse direction if the front panel VISS switch ❹ is set to ON. (☞ p. 32)

PLAY/X2 button
- Starts playback.
- Starts double-speed playback when pressed in the Play mode.
- Re-starts normal playback when pressed in the Still, Double-speed, or Search mode.
- Re-starts recording when pressed in the Record-Pause mode.

STOP button
- Stops the tape.

PAUSE/STILL button
- Temporarily stops recording when pressed in the Record mode.
- Displays a still picture when pressed in the Play mode.
- Starts one-shot recording when pressed in the One-shot Recording Standby mode. (☞ p. 25)

FF button
- Starts tape fast forward when pressed in the Stop mode.
- Starts high-speed forward shuttle search when pressed in the Play mode.
- Starts alarm search in the forward direction when the front panel VISS switch ❹ is set to ON. (☞ p. 32)

❷ **ON SCREEN buttons**

To select on-screen modes and character position.

ON/OFF button

ON: To record time/date information together with the input signal and superimpose it on the picture.

OFF: To defeat recording and superimposition of time/date information.

POS H button
- To horizontally shift superimposed time/date characters.

POS V button
- To vertically shift superimposed time/date characters.

SELECT button
- To select the On-Screen Display mode. Six different displays are available (☞p.14 "On-Screen Display and Setup Menu").

❸ **TIMER/TDG buttons**

To set the timer and time/date generator.

TIMER button
- Engages the Timer Standby mode after the 14-day/8-event timer has been programmed.

PROGRAM/CLOCK button
- Switches the display mode between Clock mode, Clock Set mode, and Timer Set mode.

REPEAT button
- To select weekly and daily timer programming options.

CANCEL button
- Engages the Cancel Program mode.
- Cancels programmed timer data.

❹ **SET/SHIFT buttons**

SET (+/–) buttons
- To set data in the Clock Set, Timer Set, or Setup Menu mode.

SHIFT (NEXT/BACK) buttons
- To select items in the Clock Set, Timer Set, or Setup Menu mode.

❺ **TIMELAPSE MODE (+/–) buttons**

To select tape speed in recording and playback. The selected mode is indicated on the display panel.

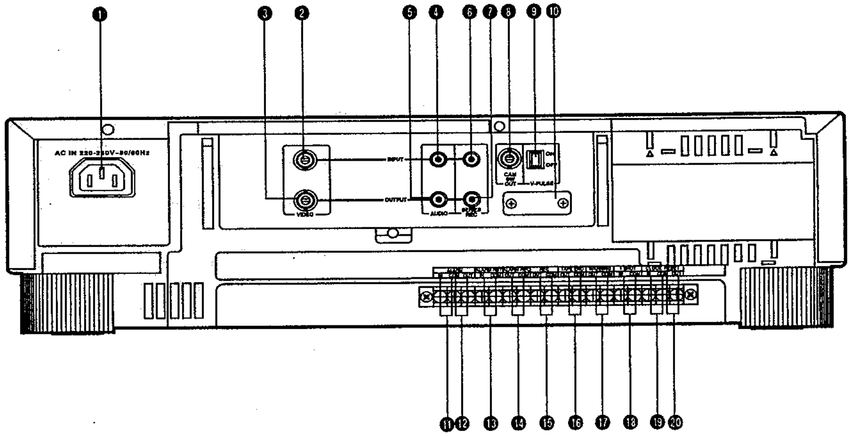
Display
000 H : One-shot recording
003 H : VHS SP mode
006 H : VHS LP mode
024 H : Timelapse 24-hour mode
048 H : Timelapse 48-hour mode
072 H : Timelapse 72-hour mode
120 H : Timelapse 120-hour mode
168 H : Timelapse 168-hour mode
240 H : Timelapse 240-hour mode
480 H : Timelapse 480-hour mode
960 H : Timelapse 960-hour mode

❻ **HOUR METER button**
- Displays the total VCR operating time on the display panel (up to 9999 hours). To cancel the hour meter display, press it again. (☞ p. 13)

❼ **COUNTER RESET button**
- Resets the counter on the display panel to zero.

❽ **REC CHECK/SENS REC ST-BY button**
- When pressed during recording, plays back the last recorded segment in reverse for about 2 seconds, and then resumes recording. (REC CHECK)
- When pressed in the Stop mode, engages the Sensor Recording Standby mode when on-screen setup menu item "SENSOR REC" is set to "ON". (For "SENSOR RECORDING", ☞ p. 25)

## REAR PANEL



❶ **AC Input socket (AC IN 220V-240V)**

Connect the provided power cord.
- Connect to a 220V-240V AC, 50/60 Hz power outlet.

❷ **VIDEO IN connector (BNC)**

❸ **VIDEO OUT connector (BNC)**

Outputs the signal input to the VIDEO IN connector ❷ even when power is off.

❹ **AUDIO IN connector**

❺ **AUDIO OUT connector**

❻ **SERIES REC IN terminal**
- Connect to the SERIES REC OUT terminal of another recorder for series recording. When the tape in the preceding recorder reaches the end, a signal will be delivered to this terminal. Recording will start automatically.

❼ **SERIES REC OUT terminal**
- Connect to the SERIES REC IN terminal of another recorder for series recording. When the tape in this recorder reaches the end, a signal will be delivered to the connected recorder for automatic start of recording.

**⑧ CAMERA SW OUT connector**
- Connect to a sequential camera switcher to deliver a command signal for camera switching.

Note:
Low active pulse, width: 5 m sec.

**⑨ V.PULSE switch**
ON: Set to this position when using non-interlaced cameras. Vertical dancing of the playback picture will be reduced.
OFF: No effect. Normally set to this position.

**⑩ DIP switches**
Use these switches when the optional RS-232C interface board SA-K90E is installed.
- Be sure to turn the power off before setting.

SW 1 — 3: Selects RS-232C data transmission speed.

| | 600 (bps) | 1200 (bps) | 2400 (bps) | 4800 (bps) | 9600 (bps) |
|---|---|---|---|---|---|
| SW-1 | ON | ON | ON | OFF | OFF |
| SW-2 | ON | ON | OFF | ON | OFF |
| SW-3 | ON | OFF | OFF | OFF | OFF |

SW 4 — 8: Not used.

**⑪ ALARM IN/COM terminals**
- Connect to an external sensor for alarm signal input.

**⑫ ALARM OUT/COM terminals**
- Outputs the alarm signal input to ALARM IN.

**⑬ ALARM RST IN/COM terminals (Alarm reset)**
- Cancels alarm recording but does not cancel alarm input data.

**⑭ ALARM REC OUT/COM terminals**
- Outputs +12 V during alarm recording.

**⑮ REC OUT/COM terminals**
- Outputs +12 V during recording.

**⑯ TAPE END OUT/COM terminals**
- Outputs +12 V during recording. Drops to 0 V (GND level) when tape end is detected.
- Connect to an external alarm lamp or buzzer.
- To cancel output, press EJECT, PLAY, FF, or REW.
- When VCR detects tape end during auto repeat recording or recording in Auto Rewind mode, the pulse is output for about 2 seconds.

**⑰ WARNING OUT/COM terminals**
- Outputs a warning signal when a malfunction occurs in the mechanism or while the tape is running.

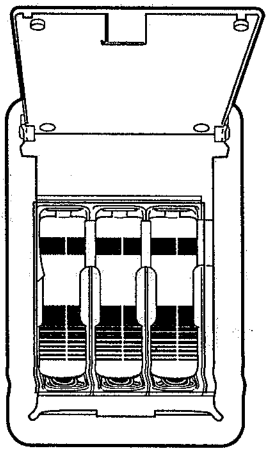
**⑱ 1 SHOT IN/COM terminals**
- Connect to a remote control switch for one-shot field recording.

**⑲ CLOCK RESET IN/COM terminals**
- Connect to another BR-9020E's CLOCK RESET OUT terminal to automatically reset the clock. When the IN and COM terminals are short-circuited, the seconds will be reset to "00". If more than 30 seconds elapse when resetting, the minutes will advance. The clock time (hours, minutes, seconds) is displayed on the screen.
eg. 10:35:29 → 10:35:00
10:35:30 → 10:36:00

**⑳ CLOCK RESET OUT/COM terminals**
- Outputs 0 V (GND level) at 12:00 AM and 12:00 PM for automatic adjustment of all connected VCR clocks.

## TOP PANEL

( TOP PANEL SECTION )



**① Battery holder**
- Insert TDG backup batteries (R6/AA/UM-3) in here.

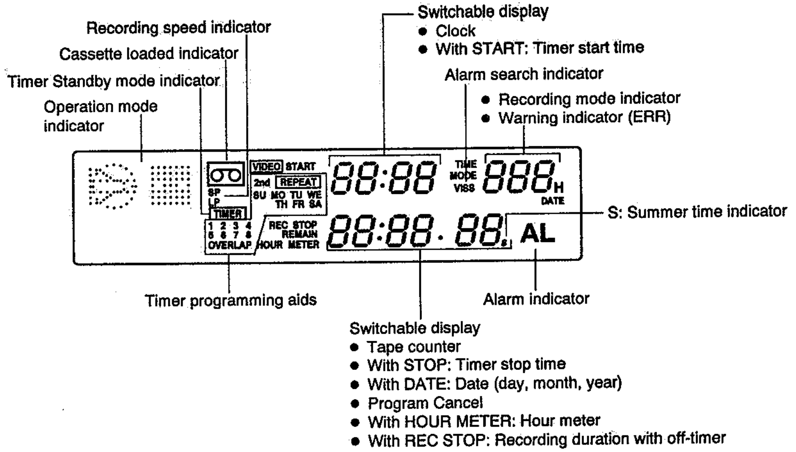
**NOTES:**
- Batteries must be replaced once a year.
- When the backup batteries have been in use for a long period, check the time and date to confirm that data is correct.
- When the BATTERY indicator on the front panel is lit, the batteries must be replaced.

The indication and mark shown below applies only to Holland.

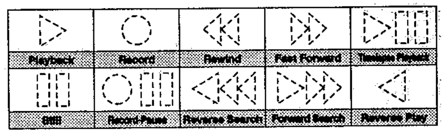
NL Niet weggooien,
maar inleveren
als KCA.

# DISPLAYS

## FLUORESCENT DISPLAY PANEL


Recording speed indicator
Cassette loaded indicator
Timer Standby mode indicator
Operation mode indicator
Switchable display
● Clock
● With START: Timer start time
Alarm search indicator
● Recording mode indicator
● Warning indicator (ERR)
S: Summer time indicator
Timer programming aids
Alarm indicator
Switchable display
● Tape counter
● With STOP: Timer stop time
● With DATE: Date (day, month, year)
● Program Cancel
● With HOUR METER: Hour meter
● With REC STOP: Recording duration with off-timer
SP
LP
TIMER
VIDEO
START
2nd
REPEAT
SU MO TU WE TH FR SA
1 2 3 4 5 6 7 8
OVERLAP
REC STOP
REMAIN
HOUR METER
88:88
TIME MODE
VISS
888H
DATE
88:88.88
AL

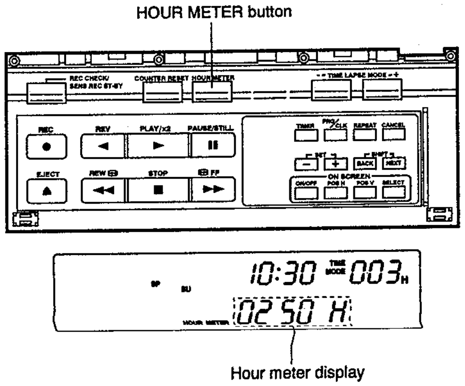
**Tape Operation Mode Indicators**


Playback
Record
Rewind
Fast Forward
Timelapse Playback
Still
Record-Pause
Reverse Search
Forward Search
Reverse Play

## HOUR METER DISPLAY

The BR-9020E incorporates an the hour meter which can display total drum rotating hours.

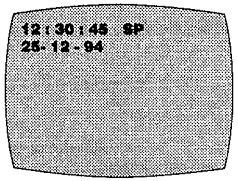
1. Press POWER to turn the VCR power on.
2. Press the HOUR METER button.
   - Counter display changes to display total drum rotating hours.
3. Press again to cancel.


HOUR METER button
REC CHECK/
COUNTER RESET
HOUR METER
TIME LAPSE MODE
REC
REV
PLAY/x2
PAUSE/STILL
EJECT
REW
STOP
FF
TIMER
REPEAT
CANCEL
BACK
NEXT
ON SCREEN
ON/OFF
SELECT
10:30
TIME MODE
003H
HOUR METER
02 50 H
Hour meter display

# ON-SCREEN DISPLAY AND SETUP MENU

To check time and date, or alarm/power-loss memory data, use the on-screen display. The setup menu is also available on-screen.

1. Turn on the VCR and monitor.
   On-screen page 1 appears.
   Page 1: Time, date, and recording speed.
   - If nothing is displayed, press ON SCREEN ON/OFF.

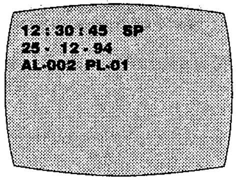


```
12 : 30 : 45   SP
25- 12 - 94
```

**On-screen page 1**

2. Press ON SCREEN SELECT.
   On-screen page 2 appears.
   Page 2: Time, date, and recording speed, plus alarm input and power loss totals.
   - On-screen page 2 will appear if ON SCREEN SELECT is pressed when no on-screen indication is on the monitor screen.

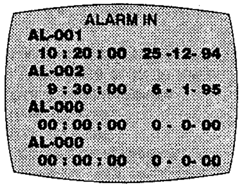
   **Note:**
   - The positions of on-screen pages 1 and 2 can be moved with the POS H/POS V button (see page 10).



```
12 : 30 : 45   SP
25 - 12 - 94
AL-002  PL-01
```

**On-screen page 2**

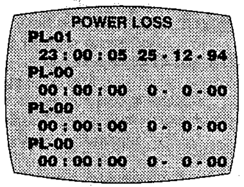
3. Press ON SCREEN SELECT.
   On-screen page 3 appears.
   Page 3: ALARM IN data with time and date for the first alarm input and the last three.



```
       ALARM IN
AL-001
 10 : 20 : 00   25 -12- 94
AL-002
  9 : 30 : 00    6 - 1- 95
AL-000
 00 : 00 : 00    0 - 0- 00
AL-000
 00 : 00 : 00    0 - 0- 00
```

**On-screen page 3**

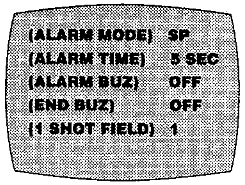
4. Press ON SCREEN SELECT.
   On-screen page 4 appears.
   Page 4: POWER LOSS data with time and date for the first power loss and the last three.



```
      POWER LOSS
PL-01
 23 : 00 : 05  25 - 12 - 94
PL-00
 00 : 00 : 00   0 -  0 - 00
PL-00
 00 : 00 : 00   0 -  0 - 00
PL-00
 00 : 00 : 00   0 -  0 - 00
```

**On-screen page 4**

5. Press ON SCREEN SELECT.
   On-screen page 5 appears.
   Page 5: Setup Menu.



```
(ALARM MODE)    SP
(ALARM TIME)    5 SEC
(ALARM BUZ)     OFF
(END BUZ)       OFF
(1 SHOT FIELD)  1
```

**On-screen page 5**

To change the setting, select the item with the SHIFT NEXT or BACK button and set the data with the SET "+" or "–" button. Available settings are as follows:

ALARM MODE: SP ↔ LP
ALARM TIME: 5 SEC → 10 SEC → 15 SEC → 30 SEC → 60 SEC → 180 SEC → TAPE E (End) → MANUAL (during alarm input) → 5 SEC...
ALARM BUZ: OFF ↔ ON
END BUZ: OFF ↔ ON
1 SHOT FIELD: 1 → 2 → 5 → 10 → 1 ... (☞ p.25)

**NOTES:**
- The buzzer for tape-end beeps for about 3 minutes (during recording).
- To stop the buzzer, set menu item "END BUZ" to OFF, or press either STOP or POWER.
- If "ALARM TIME" is set to "MANUAL", index codes will not be properly recorded on alarm recordings of less than 30 seconds.

6. Press ON SCREEN SELECT.
   On-screen page 6 appears.
   Page 6: Setup Menu.

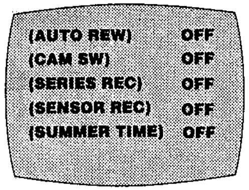
To change the setting, select the item with the SHIFT NEXT or BACK button and set the data with the SET "+" or "–" button. Available settings are as follows:

AUTO REW: OFF ↔ ON
CAM SW: OFF → 1 FIELD → 1 FRAME → 2 FRAMES → 25 FRAMES → 50 FRAMES → OFF ...
SERIES REC: OFF ↔ ON
SENSOR REC: OFF ↔ ON
SUMMER TIME: OFF ↔ ON
OFF ... Does not execute summer time compensation.
ON ... Executes summer time compensation (time advances one hour).

**CAM SW setting**

When recording with several cameras using a sequential switcher, be sure to set the camera switching interval ("CAM SW") to an item other than "OFF". Camera switching is not possible if "CAM SW" is left set to its initial setting ("OFF"). Set to "OFF" only when using a single camera and no camera switching is required.

**NOTES:**
- Repeat recording/playback is automatically engaged regardless of the setting of "AUTO REW" if the REPEAT REC/PLAY switch is set to ON.
- When "AUTO REW" is set to "ON", set the COUNTER MEMORY switch to OFF.
- When engaging recording or alarm recording in the VHS LP mode, set the camera switching interval (CAM SW) to at least 1 frame.
- The on-screen menu cannot be switched off by pressing ON SCREEN ON/OFF when on-screen pages 3 to 6 are displayed. To deactivate the menu, return to on-screen page 1 or 2 (time/date display) and then press ON SCREEN ON/OFF.



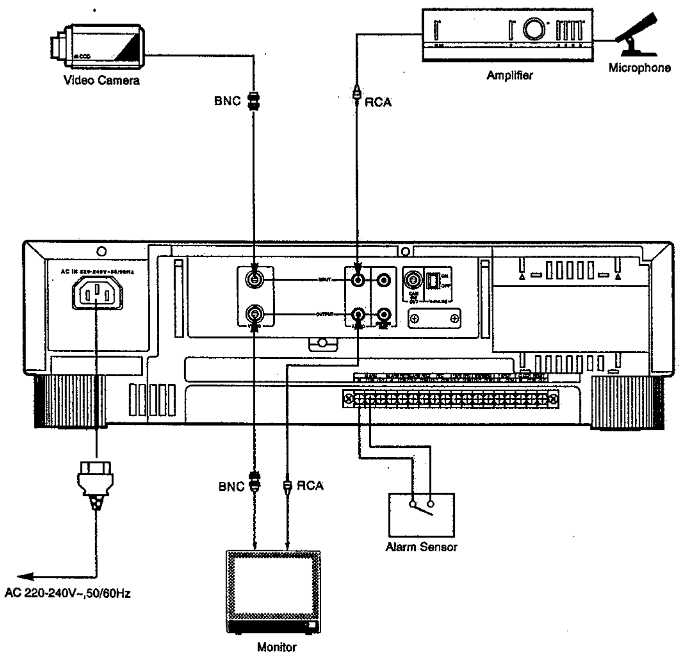
```
(AUTO REW)      OFF
(CAM SW)        OFF
(SERIES REC)    OFF
(SENSOR REC)    OFF
(SUMMER TIME)   OFF
```

On-screen page 6

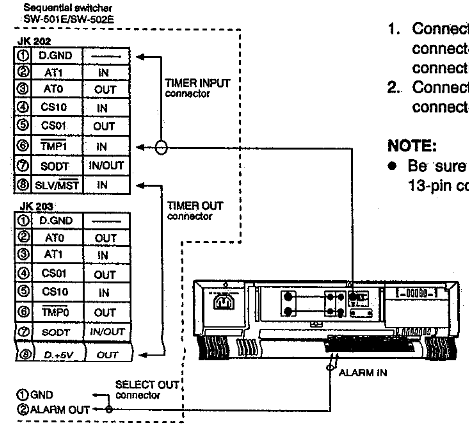
- The setup menu is backed up by backup batteries in the event of a power failure. If the batteries fail, "SU 0:00" will blink on the VCR's display and the setup menu will be reset to the factory preset settings. In this case, change batteries and set the menu again.

# CONNECTIONS

## CONNECTING TO A SINGLE CAMERA WITH A BUILT-IN SSG


Video Camera
Amplifier
Microphone
BNC
RCA
BNC
RCA
Alarm Sensor
AC 220-240V~,50/60Hz
Monitor

## CONNECTION TO THE SW-501E/SW-502E SEQUENTIAL SWITCHER


Sequential switcher
SW-501E/SW-502E
TIMER INPUT connector
TIMER OUT connector
SELECT OUT connector
①GND
②ALARM OUT
ALARM IN

JK 202

| | | |
|---|---|---|
| ① | D.GND | —— |
| ② | AT1 | IN |
| ③ | AT0 | OUT |
| ④ | CS10 | IN |
| ⑤ | CS01 | OUT |
| ⑥ | $\overline{\text{TMP1}}$ | IN |
| ⑦ | SODT | IN/OUT |
| ⑧ | SLV/$\overline{\text{MST}}$ | IN |

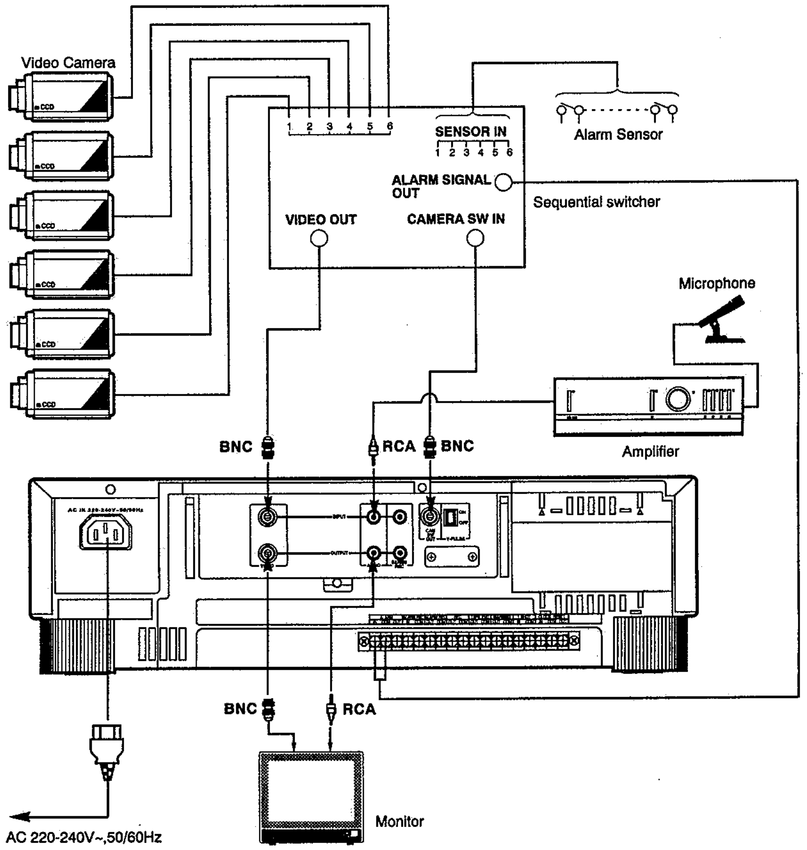
JK 203

| | | |
|---|---|---|
| ① | D.GND | —— |
| ② | AT0 | OUT |
| ③ | AT1 | IN |
| ④ | CS01 | OUT |
| ⑤ | CS10 | IN |
| ⑥ | $\overline{\text{TMP0}}$ | OUT |
| ⑦ | SODT | IN/OUT |
| ⑧ | D.+5V | OUT |

1. Connect pin 6 of the sequential switcher's TIMER INPUT connector to the VCR's CAMERA SW OUT terminal while connecting pin 1 to the GND terminal.
2. Connect pin 8 of the sequential switcher's TIMER INPUT connector to pin 8 of its TIMER OUT connector.

**NOTE:**
- Be sure to use 8-pin DIN connector, BNC connector, and 13-pin connector for connections.

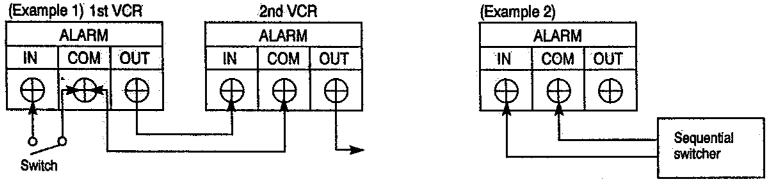
## CONNECTION TO SEVERAL CAMERAS VIA A SEQUENTIAL SWITCHER


Video Camera
1 2 3 4 5 6
SENSOR IN
1 2 3 4 5 6
Alarm Sensor
ALARM SIGNAL OUT
Sequential switcher
VIDEO OUT
CAMERA SW IN
Microphone
Amplifier
BNC
RCA
BNC
BNC
RCA
AC 220-240V~,50/60Hz
Monitor

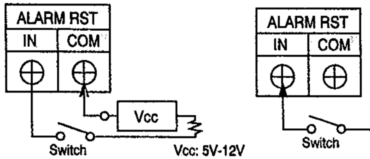
**NOTES:**
- Camera signals can be monitored even if the recorder's power is off.
- When connecting to the SW-C300E or SW-501E/SW-502E, set the timelapse mode to 24 hours or longer.
- When connecting to a sequential switcher with an alarm input terminal, set the On-Screen Setup Menu item "ALARM TIME" to "MANUAL".
  *Alarm time setting is done by the sequential switcher.*
- Synchro should be applied to all connected video cameras.

## INPUT/OUTPUT TERMINAL CONNECTIONS

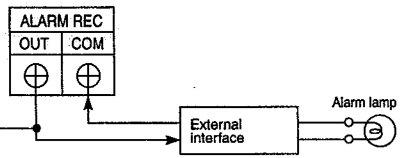
**ALARM IN/OUT**


(Example 1) 1st VCR
2nd VCR
(Example 2)
ALARM
IN
COM
OUT
Switch
Sequential switcher

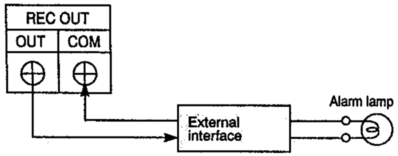
**ALARM RESET**


ALARM RST
IN
COM
Vcc
Switch
Vcc: 5V-12V
Switch

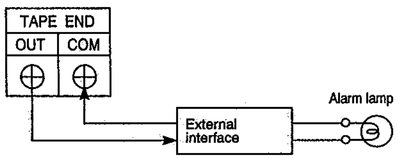
**ALARM REC**


ALARM REC
OUT
COM
External interface
Alarm lamp

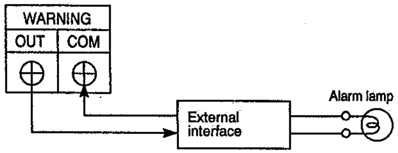
**REC OUT**


REC OUT
OUT
COM
External interface
Alarm lamp

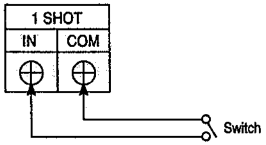
**TAPE END**


TAPE END
OUT
COM
External interface
Alarm lamp

**WARNING**

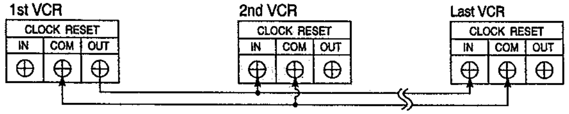

WARNING
OUT
COM
External interface
Alarm lamp

**1 SHOT**

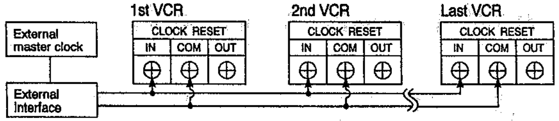

1 SHOT
IN
COM
Switch

**CLOCK RESET**

- When adjusting the clock to 1st VCR's clock

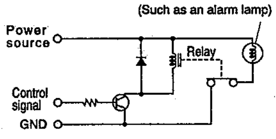

1st VCR
2nd VCR
Last VCR
CLOCK RESET
IN
COM
OUT

- When adjusting the clock to external master clock


1st VCR
2nd VCR
Last VCR
CLOCK RESET
IN
COM
OUT
External master clock
External Interface

### External Interface example

Example: A lamp lights with HIGH signal


(Such as an alarm lamp)
Power source
Relay
Control signal
GND

- **Use appropriately rated devices.**

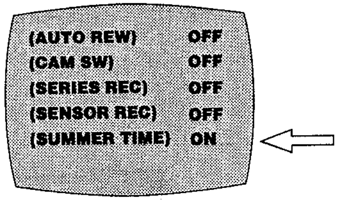
# CLOCK SETTING

Time/date generation and timer operation are not possible if the clock has not been set.

## SUMMER TIME COMPENSATION

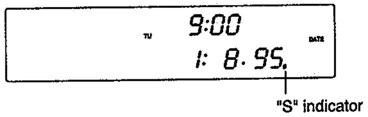
The setting of the "SUMMER TIME" menu switch on on-screen menu page 6 determines whether or not the summer time mode is engaged.

When the "SUMMER TIME" switch is set to ON, the currently set time advances one hour and "S" lights on the counter display.



(AUTO REW) OFF
(CAM SW) OFF
(SERIES REC) OFF
(SENSOR REC) OFF
(SUMMER TIME) ON

On-screen page 6


9:00
1: 8.95.
"S" indicator

- When setting the time, make sure the "SUMMER TIME" switch is set to OFF.
  When the unit is shipped, this switch is set to OFF.
- Clock setting is not possible during timer recording.

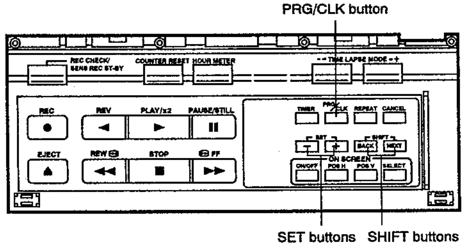
### During Daylight Savings Time

1. Set the time with one-hour delay.
2. After setting the time, set the "SUMMER TIME" switch to ON.
   - The set time advances one hour. "S" lights on the counter display.
3. At the end of the Daylight Savings Time season, set the "SUMMER TIME" switch to OFF.
   - "S" will not appear on the display when the standard time instead of "Summer Time" is displayed.

### Standard Time

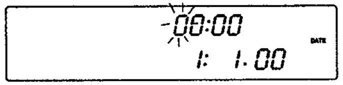
1. Set the clock to the actual time.
2. When Daylight Savings starts, set the "SUMMER TIME" menu switch to ON.
   - The time advances one hour and "S" lights on the counter display.

## CLOCK SETTING PROCEDURE


PRG/CLK button
SET buttons
SHIFT buttons
REC CHECK/ SENS REC ST-BY
COUNTER RESET
HOUR METER
TIME LAPSE MODE
REC
REV
PLAY/x2
PAUSE/STILL
EJECT
REW
STOP
FF
TIMER
PRG/CLK
REPEAT
CANCEL
SET
SHIFT
BACK
NEXT
ON SCREEN
ON/OFF
POS H
POS V
SELECT

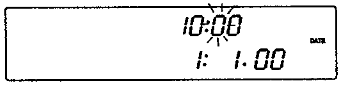
1. Press PRG/CLK until the Clock Set mode is engaged.
   - The hour indication will blink.

   Perform the next operation within 10 seconds of pressing the PRG/CLK button.

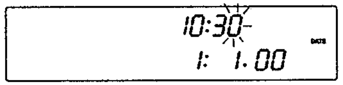

00:00
1: 1.00
DATE

2. Enter the hour with either SET button, and press SHIFT NEXT.
   - To enter one digit only, press SHIFT NEXT, then set the number.

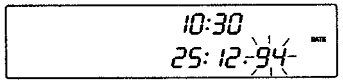
   As soon as the SET or SHIFT buttons are pressed, the seconds will be reset to "00". Seconds are shown on screen.


10:00
1: 1.00
DATE

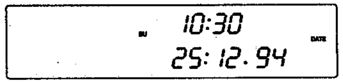
3. Enter the minutes with either SET button, and press SHIFT NEXT.


10:30
1: 1.00
DATE

4. Enter the day, month, and year in the same way.
   - In year setting, set only the last two digits of the year.
   - If you make a mistake, press SHIFT NEXT or SHIFT BACK to return to the item.


10:30
25: 12.94
DATE

5. Press PRG/CLK to end clock setting.
   - Time-keeping starts. Counting starts from "00" seconds.
   - The day-of-the-week indication is automatically displayed.


SU
10:30
25: 12. 94
DATE

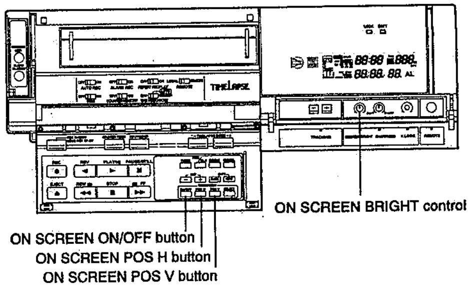
**NOTE:**
- For February 29, set the date in the order of year, month and day.

**Power failure indicator**
- A blinking "SU 0:00" indicates that the backup batteries *have been discharged. Replace the batteries and set the* clock and Setup menu again.

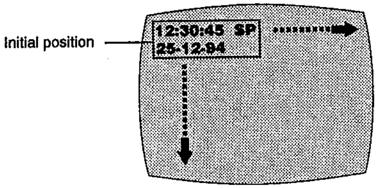
## TIME/DATE GENERATOR

The built-in time/date generator allows you to superimpose the time and date on the video image and record it.

- Make sure the recorder's clock is set correctly. ☞ p.20.


ON SCREEN BRIGHT control
ON SCREEN ON/OFF button
ON SCREEN POS H button
ON SCREEN POS V button
TIMELAPSE

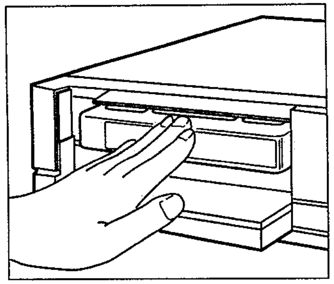
1. Turn on the VCR and monitor.
   - Time/date display appears on the screen. If nothing is displayed, press ON SCREEN ON/OFF.
2. Press ON SCREEN POS H and POS V to move the cursor to the position where you want the superimposed characters to appear.
   - Pressing POS H moves the cursor to the right in 19 steps. Pressing the button again when the cursor is on the left of the screen will return it to the left.
   - Pressing POS V moves the cursor down the screen in 17 steps. Pressing the button again when the cursor is at the bottom of the screen will return it to the top.
3. Adjust the brightness of the time/date display with the ON SCREEN BRIGHT control.
   - Turn clockwise to increase brightness or counterclockwise to decrease it.


Initial position
12:30:45 SP
25-12-94

**NOTES:**
- The clock must be reset after the recorder has been unplugged for a long period of time.
- Because the clock may gain or lose up to 60 sec. a month due to environmental variations such as temperature fluctuations, we recommend that the clock be adjusted on a regular basis.

# HANDLING VIDEO CASSETTES

## LOADING



1. Insert a cassette with its label side facing you.
   - The power will come on automatically.
   - If the safety tab has been removed, playback will start automatically.
   - For best results, use only JVC video cassettes with recording times less 180 minutes (E-180).

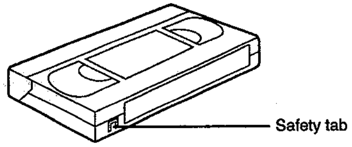
## UNLOADING

1. Press EJECT.
   - Even when the power is off, simply press the EJECT button to unload a cassette.
   - If the cassette will not eject, check to see if "TIMER" is displayed on the display panel. If it is, press the TIMER button to turn off the Timer Standby mode.

**WARNING**
- Do not insert fingers or foreign objects into the cassette loading slot as this may result in personal injury or damage to the mechanism.
- Do not try to remove the cassette once automatic loading has started.

## ACCIDENTAL ERASURE PREVENTION

- To prevent accidental recording on a recorded cassette, remove its safety tab.
- To record on it later, cover the hole with adhesive tape.

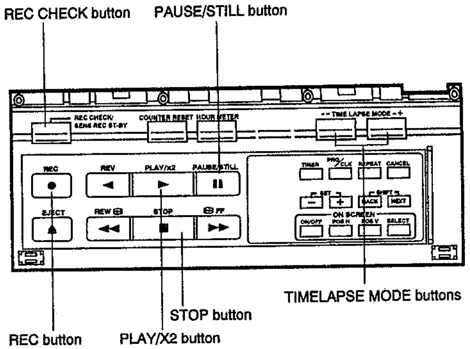


# RECORDING

## BASIC PROCEDURE

- Connect necessary components correctly. ☞ p.16.
- Set the VHS VIDEO MODE switch as required.

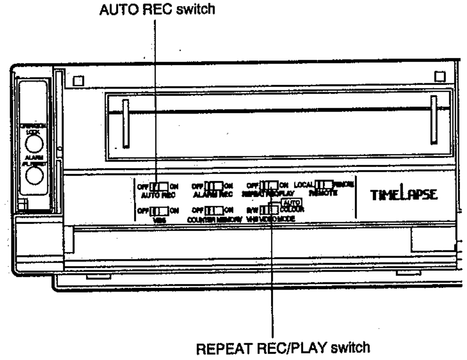
1. Load a cassette with safety tab in place.
2. Press TIMELAPSE MODE +/– to select the recording mode.
   - The recording mode will appear on the FDP.
3. Press REC to start recording.
   - To verify picture quality during recording, press REC CHECK. The tape will play back the last recorded segment in reverse, then resume recording.
4. To temporarily stop recording, press PAUSE/STILL.
   - The recorder will enter the Record-Pause mode. If the recorder remains in this mode for more than 5 min. (approx.), it will automatically enter the Stop mode.
5. To re-start recording, press PLAY/X2.
6. To end recording, press STOP.


REC CHECK button
PAUSE/STILL button
TIMELAPSE MODE buttons
STOP button
REC button
PLAY/X2 button
REC
REV
PLAY/X2
PAUSE/STILL
EJECT
REW
STOP
FF
COUNTER RESET
HOUR METER
TIMER
REPEAT
CANCEL
ON/OFF
SELECT

**Repeat Recording**
Set the REPEAT REC/PLAY switch to ON. The recorder will automatically rewind the tape at tape end (regardless of the setting of the On-Screen Setup Menu item "AUTO REW"), and start recording again from the beginning.

**Automatic Start of Recording After Power Failure**
Set the AUTO REC switch to ON. If a power failure occurs during recording, recording will re-start automatically when power is restored. The recording mode will be the same as when power was lost.

**NOTES:**
- If repeat recording is used, any previously recorded alarm recording will be erased and replaced by the new recording.
- During repeat recording, counter memory and VISS index search (alarm search) are ignored.
- Keep in mind that when the AUTO REC switch is left set to ON, the VCR will automatically enter the Record mode when the power is turned on.

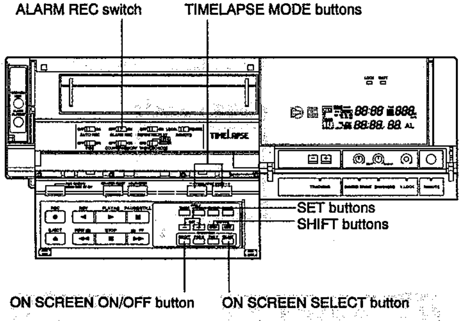

AUTO REC switch
REPEAT REC/PLAY switch
AUTO REC
ALARM REC
REPEAT REC/PLAY
REMOTE
VISS
COUNTER MEMORY
VHS VIDEO MODE
TIMELAPSE

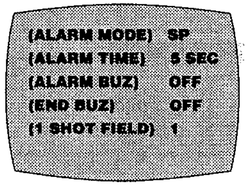
# ALARM RECORDING

Alarm recording allows the recorder to automatically switch to the pre-selected 3-hour (SP) or 6-hour (LP) continuous recording mode when an alarm signal is received via the rear panel ALARM IN/COM terminals. Recording will continue for the pre-selected duration.

- Connect necessary components correctly. ☞ p.16~18

1. Press ON SCREEN ON/OFF or ON SCREEN SELECT to activate the on-screen display.
2. Press ON SCREEN SELECT to call up on-screen page 5.
3. Press SHIFT BACK/NEXT to select "ALARM MODE".
4. Press SET +/– to set SP or LP.
   - Alarm recording will take place in the selected mode.
5. Press SHIFT BACK/NEXT to select "ALARM TIME".
6. Press SET +/– to set the alarm recording duration.
   - Selectable from 8 settings. If set to "TAPE E", alarm recording continues until the end of the tape is reached. If set to "MANUAL", alarm recording continues as long as the alarm signal is being input. Use this position if you use a type of alarm sensor which outputs pulses continuously until it resets to normal.
   - When alarm time is set to "MANUAL", index codes will not be properly recorded on alarm recordings of less than 30 seconds.
7. Press SHIFT BACK/NEXT to select "ALARM BUZ".
8. Press SET +/– to set ON or OFF.
   - If set to ON, the built-in electronic buzzer signals the start of alarm recording.
9. To cancel the on-screen display, press ON SCREEN SELECT to return to page 1 or 2 (time/date display), then press ON SCREEN ON/OFF.
10. Set the ALARM REC switch to ON.
11. Press TIMELAPSE MODE +/– to select the recording mode.
12. Press REC to start recording.




(ALARM MODE) SP
(ALARM TIME) 5 SEC
(ALARM BUZ) OFF
(END BUZ) OFF
(1 SHOT FIELD) 1

On-screen page 5

| | | | | | | |
|---|---|---|---|---|---|---|
| Display | "ALARM" on the screen | OFF | ON | OFF | ON | OFF |
| | "AL" on the display panel | OFF | ON | BLINK | ON | BLINK |
| Recording mode | | Timelapse recording | SP or LP | Timelapse recording | SP or LP | Timelapse recording |

Alarm recording takes place.
Alarm signal enters

Alarm recording takes place.
Alarm signal enters

**NOTES:**
- An index code is recorded when the recorder switches from Timelapse to Alarm Recording.
- Alarm recording is not possible in the one-shot recording mode.
- If alarm recording is engaged in timer recording, alarm recording *will stop at the preset timer-stop time.*
- Alarm recording functions regardless of the setting of on-screen page 6 "SENSOR REC".
- There may be some picture distortion at the start- or end-point of an alarm recording. This is not a malfunction.

# SENSOR RECORDING

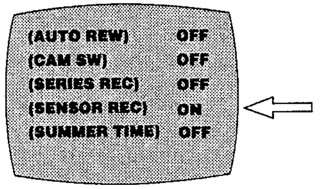
With sensor recording, the recorder automatically starts recording only when an alarm signal is received (while in the Stop mode). Recording will continue for the pre-selected duration. Sensor recording will take place even in the Timer Standby mode.

- Connect necessary components correctly. (☞ p. 16~18)

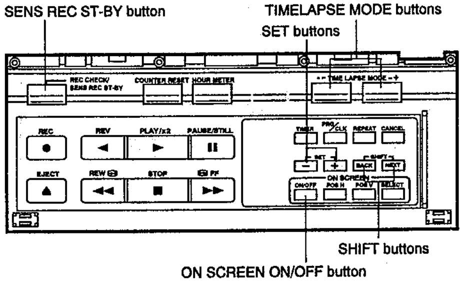
After step 8 of "ALARM RECORDING" (☞ p. 24).

9. Press ON SCREEN SELECT to call up on-screen page 6.
10. Press SHIFT BACK NEXT to select "SENSOR REC".
11. Press SET +/- set to on.
12. To cancel the on-screen display, press ON SCREEN SELECT to return to page 1 or 2 (time/date display), then press ON SCREEN ON/OFF.
13. Press SENS REC ST-BY.
    - The recorder enters the Sensor recording standby mode.
    - Recording will start automatically when an alarm signal is input and end after the pre-selected duration (☞ p. 24). The VCR will then return to the Sensor recording standby mode.
14. To stop sensor recording or cancel the alarm display, press ALARM/PL RESET. To cancel sensor recording, set "SENSOR REC" on on-screen page 6 to "OFF".

**NOTES:**
- Sensor recording can also be entered from the Stop mode without engaging the Sensor recording standby mode. In this case, recording will take more than 5 seconds to start.
- Sensor recording can also be engaged when the power is off. However, the VCR will not switch off after sensor recording is finished; instead it will enter the recording standby mode.
- There may be some picture distortion between takes in sensor recording. This is not a malfunction.


(AUTO REW) OFF
(CAM SW) OFF
(SERIES REC) OFF
(SENSOR REC) ON
(SUMMER TIME) OFF

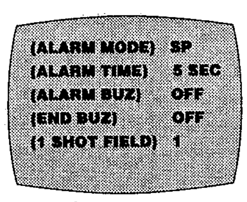
On-screen page 6



# ONE-SHOT FIELD RECORDING

In normal timelapse recording one field is recorded at a time. One-shot field recording gives you greater flexibility by allowing you to choose how many fields are to be recorded at one time.

1. Press ON SCREEN ON/OFF or ON SCREEN SELECT to activate the on-screen display.
2. Press ON SCREEN SELECT to call up on-screen page 5.
3. Press SHIFT BACK/NEXT to select "1 SHOT FIELD".
4. Press SET +/– to set number of fields to be recorded.
   - Selectable from 1, 2, 5, and 10 fields. The recording interval is 0.32 seconds (corresponds to 48-hour mode).
5. To cancel the on-screen display, press ON SCREEN SELECT to return to page 1 or 2 (time/date display), then press ON SCREEN ON/OFF.
6. Set the recording time to "000H" with TIMELAPSE MODE +/– buttons and press REC.
   - The recorder enters the Record-Pause mode.
7. To start one-shot field recording, press PAUSE.
   - The designated number of fields are recorded and the recorder enters the Record-Pause mode.
   - You can also start one-shot recording by connecting an external switch to the 1 SHOT IN/COM terminals on the rear panel.
8. *To cancel one-shot recording, press STOP or set to a recording* time other than "000H". If the Record-Pause mode continues for more than 3 minutes, the recorder automatically restarts the current one-shot recording.


(ALARM MODE) SP
(ALARM TIME) 5 SEC
(ALARM BUZ) OFF
(END BUZ) OFF
(1 SHOT FIELD) 1

On-screen page 5

NOTE:
- *During playback in the SP mode, there may be colour loss in those sections of the tape recorded in the one-shot field recording mode.*

# SERIES RECORDING

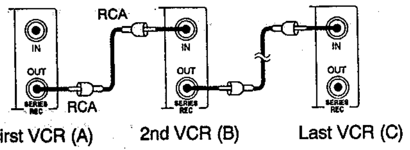
By connecting several BR-9020Es in series you can obtain in-depth coverage over a long period of time.

1. Engage the On-Screen Setup Menu and set SERIES REC to "ON" for all connected recorders. ☞ p.15
   To cancel the on-screen display, press ON SCREEN SELECT to return to page 1 or 2 (time/day display), then press ON SCREEN ON/OFF.
2. Load cassettes with safety tab in place in all connected recorders.
3. Set all recorders (except A) in the Stop mode with power turned on.
4. Operate Recorder A for recording.
   When Recorder A reaches tape end, it will transmit a series control command to Recorder B. Recorder B will start recording.

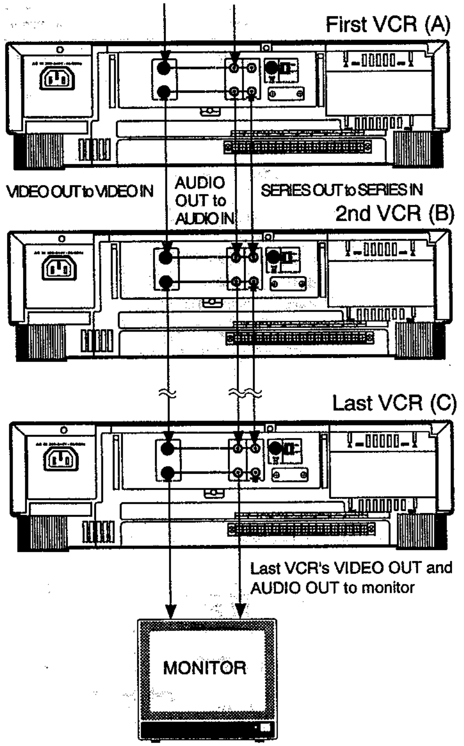
**NOTES:**
- A series control command can be accepted while the recorder is in the Rewind mode. In this case, recording will start once rewind is completed.
- Do not put Recorder B (and subsequent ones) in the Play, Still, Record, or Record-Pause mode.
- Series operation will stop if the series control command is delivered to an unloaded VCR or one in which the loaded cassette's safety tab has been removed. Be sure that cassettes are loaded in all connected VCRs.
- Series operation can be cancelled at any time by pressing the currently-operating VCR's STOP button.

## Connections

With multiple VCRs



Source to first VCR's VIDEO IN and AUDIO IN

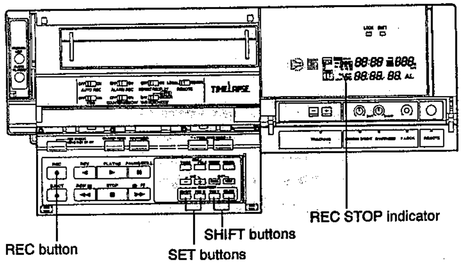


(Be sure to terminate the signals at the monitor with a 75-ohm terminating connector.)

# INSTANT TIMER RECORDING (OFF-TIMER)

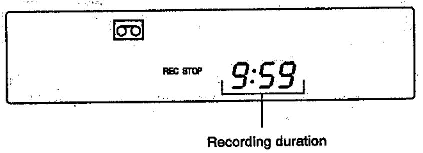
You can set the VCR to automatically stop recording and shut off after a specified timespan.

1. Press REC while in the Record mode to activate the off-timer.
   - "REC STOP" lights on the display panel. Recording duration is set at "0:30" (30 minutes).
   - The off-time can be delayed in 30-minute increments (up to 9 hours) by pressing REC.
   - Each time the REC button is pressed, the recording time changes from 0:30 → 1:00 → 1:30 → 2:00 ..... 9:00 → Normal recording → 0:30 .....



**Off-Time Setting In 1-Minute Increments**
Once the off-timer has been activated, the off-time can be set more precisely (up to 9 hours, 59 minutes). Incremental setting is not possible with the On-Screen Setup Menu activated.
After step 1:

2. Press SHIFT NEXT or BACK.
3. Press SET to set the hour, and press SHIFT NEXT.
4. Press SET to set the minute, and press SHIFT NEXT.
   - Make entries within 4 seconds at each step.
5. When the duration is set, press REC within 4 seconds.
   - The digits will stop blinking.
   - If more than 4 seconds passes before REC is pressed, the duration is restored to its previous setting.
6. Displayed time counts down while recording is in progress. When 0:00 is reached, the Record mode is released and the power is automatically turned off.
   - If the end of the tape is reached during recording with the REPEAT REC/PLAY switch set to OFF, the cassette is ejected and power turned off.



**NOTES:**
- Instant timer recording has priority over programmable timer recording. Be sure that the preset times do not overlap.
- Instant timer recording is inoperative during sensor recording or when the clock/date has not been set.

## PROGRAMMABLE TIMER RECORDING

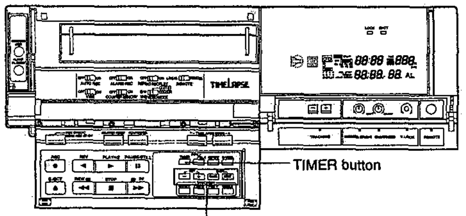
Unattended start and stop of recording is possible using the 14-day/8-event programmable timer.

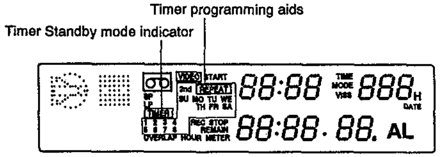
- For timer programming procedures, ☞ p.29.
- Make necessary preparations for connected components.

1. Load a cassette with safety tab in place.
2. Program the timer with the SET and SHIFT buttons. ☞ p.29.
3. Press the TIMER button to enter the Timer Standby mode.
    - "TIMER" and program number(s) appear on the display panel.
    - Recording will start at the preset time, and stop at the preset time.
    - If the end of the tape is reached during recording with the REPEAT REC/PLAY switch set to OFF, the cassette is ejected and "[OO]" indicator blinks.

**NOTE:**

- If you need to use the VCR while it is in the Timer Standby mode, press TIMER and then POWER. After using the VCR, be sure to press TIMER to engage the Timer Standby mode.





## EXTERNAL TIMER RECORDING

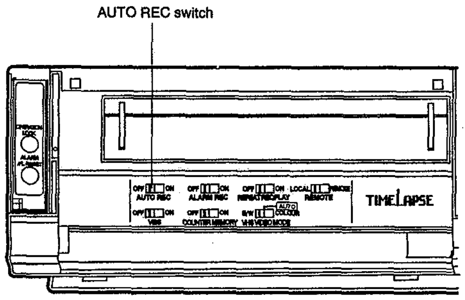
Timer recording is possible when an external timer unit is connected.

- Connect necessary components correctly.

1. Load a cassette with safety tab in place.
2. Set recording mode as required.
3. Set the AUTO REC switch to ON.
    - Recording will start when power is supplied from the timer unit at the preset time.

**NOTE:**

- This function is inoperative if the VCR is in the Timer Standby mode.



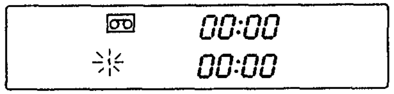
# TIMER PROGRAMMING

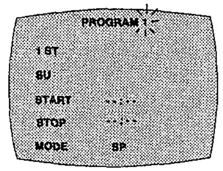
This section describes timer programming procedure only. To activate timer recording, ☞ p.28.

## PROCEDURE

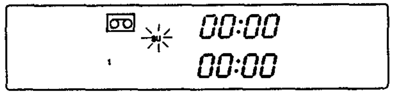
- If time and date have not been set, the Timer Setting mode cannot be engaged. Set the time and date first, then set the timer. ☞ p.19
- Turn on the VCR

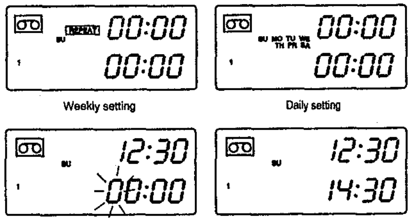
1. Press PRG/CLK to engage the Timer Set mode.
    - Program 1 will blink on the FDP.
    - To advance to another program, select a program number with SET +/–.
    - Data can also be displayed on-screen. When SET + is pressed with program 8 displayed, the display panel returns to clock display.



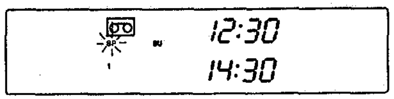


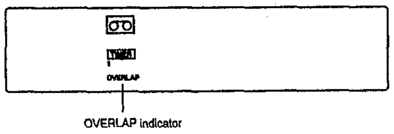
2. Press SHIFT NEXT.
   "SU" will blink on the FDP.
3. Enter the day with SET +/–.
    - The day of the week changes from 1st week to 2nd week. (eg. "SU", "MO",..."2nd SA", "2nd SU")
    - For weekly setting, press REPEAT. "REPEAT" will appear above the day.
    - For daily setting, press SET +/– until the desired option appears. ("SU"..."SA", "MO"..."SA", "MO"..."FR")
4. Press SHIFT NEXT to advance to the next step.
5. Enter the start time with SET +/– and SHIFT NEXT.
6. Enter the stop time with SET +/– and SHIFT NEXT.
7. Select the recording mode with TIMELAPSE MODE +/–.
8. Press PRG/CLK to end programming.
    - The display panel changes to the clock display.
9. Press TIMER to engage the Timer Standby mode.
    - The power is automatically turned off and the Timer Standby mode is engaged.
    - "TIMER" and the program number(s) appear on the display panel.
    - To immediately engage the Timer Standby mode, press TIMER.
    - Before engaging the Timer Standby mode, make sure that the timelapse recording mode is set as required.





Blinking item is ready to be set.



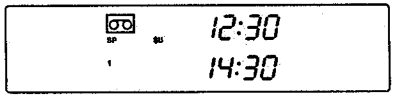


**NOTES:**

- "1st week" and "2nd week" do not refer to calendar weeks. The 1st week refers to the seven-day period beginning with the present day and the 2nd week refers to the subsequent seven-day period. These two weeks are counted from the time of setting.
- If the "OVERLAP" indication appears on the FDP when the TIMER button is pressed, it means that the start and stop times of two or more programs overlap. Check the timer data and correct as necessary. If overlapping programs are not corrected, the second program will not start until the first one is completed.

**Checking timer data**

1. Press PRG/CLK in the Timer Standby mode or Timer-Record mode.
   - Timer data for the program with the earliest start-time appears on the display panel, followed by the program with next-earliest start-time and so on. Display time is about 5 seconds for each set of program data.
   - To advance the data display manually, press SET.
2. Check the data.
   - To return to the Clock mode, press PRG/CLK. The Clock mode is returned to automatically if no action is taken for 60 seconds.



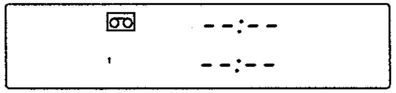
**NOTE:**

- Timer data is not displayed on screen.

**Cancelling timer data**

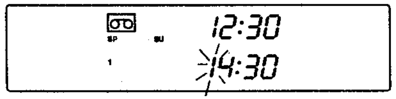
- Cancel the Timer Standby mode.

1. Press PRG/CLK.
   - Timer data for program 1 appears on the display panel.
2. Press SET to select the program you wish to cancel.
3. Press CANCEL.
   - Programmed data is cleared from memory.
4. Press PRG/CLK.
   - The display panel changes to the clock display.



**Correcting timer data**

1. Press PRG/CLK
   - Timer data for program 1 appears on the display panel.
2. Press SET+/– to select the program number you wish to correct.
3. Press SHIFT NEXT or BACK to move to the item to be corrected and enter new data with SET.
4. Press PRG/CLK.



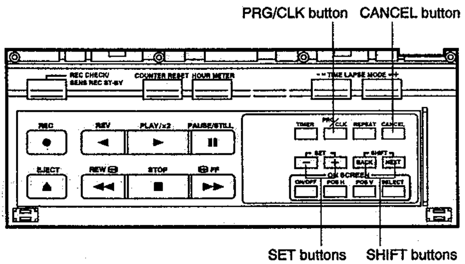
**To use the recorder while in the Timer Standby mode**

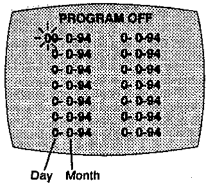
1. Press TIMER to cancel Timer Standby mode. The "TIMER" indicator goes off.
2. Press POWER to turn the power on.
   - The recorder can be used.
   - Press TIMER to return to the Timer Standby mode. The "TIMER" indicator will light.

**Program Cancel mode**

When you've set the timer for weekly or daily repeat recording, you may wish to cancel recording on specified days falling within the preset period. With the Program Cancel function, you can set the timer not to record on up to 14 specified days during the year.

1. Press CANCEL, then press PRG/CLK within 5 seconds.
   - The following display appears on-screen with day digits blinking.
   - The display panel also changes to the Program Cancel mode.
2. Set the date(s) where recording is not to take place with the SET and SHIFT buttons.
   - To cancel a preset date, press either SHIFT button until the relevant digits are blinking and press CANCEL.
3. Press PRG/CLK to return to the normal display mode.





**NOTES:**

- Program Cancel data (day and month) will remain even after the year changes.
- Year setting is not possible.

---

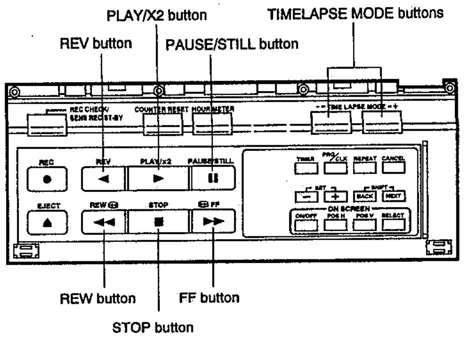
# PLAYBACK

## BASIC PROCEDURE

1. Load a cassette.
   - If the safety tab on the cassette is removed, playback starts automatically.
2. Press TIMELAPSE MODE +/– to select the appropriate playback mode.
3. Press PLAY/X2 to start playback.
   - Adjust the picture as required with the SHARPNESS control.
4. Press STOP to stop playback.

**NOTES:**

- The recorder is preset to automatically stop when the end of the tape is reached. If you want the recorder to rewind at tape end, set "AUTO REW" to "ON" via On-Screen Setup Menu page 6. ☞ p.15.
- If the REPEAT REC/PLAY switch is set to ON, playback will start again automatically from the beginning.



## DOUBLE-SPEED PLAYBACK

- Press PLAY/X2 while in the SP or LP mode to engage the Double-Speed mode.
- Press PLAY/X2 to return to the original playback mode.
- In timelapse playback, pressing PLAY/X2 engages the SP mode. Press again for Double-Speed playback.
  Timelapse Play → SP → Double-Speed Play → Timelapse Play ...

## REVERSE PLAYBACK

- Press REV while in the Play mode for reverse playback at normal speed.
- Press PLAY/X2 to return to the original playback mode.

## REWIND AND FAST-FORWARD

- Press REW or FF while in the Stop mode.
- Press STOP to stop rewind or fast-forward.
- If the COUNTER MEMORY switch is set to ON, the tape will stop at counter reading zero.

## STILL AND FIELD ADVANCE

- Press PAUSE/STILL while in the Play mode to view a still picture.
- Press PAUSE/STILL while in the Still mode to advance the picture field by field (SP mode only).
- Press PLAY/X2 to return to the original playback mode.

**NOTES:**

- To protect the tape, the Still mode is automatically cancelled after about 5 minutes.

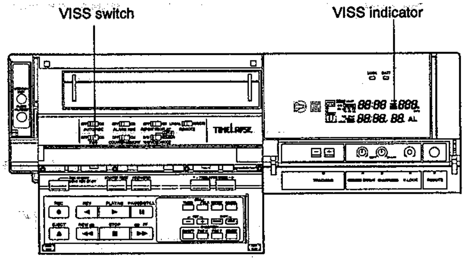
## SHUTTLE SEARCH

- Press REW while in the Play mode for high-speed reverse search at 9 times normal speed.
- Press FF while in the Play mode for high-speed forward search at 9 times normal speed.
- Press PLAY/X2 to return to the original playback mode.
- For brief searching, hold REW or FF depressed; releasing the button returns to the original playback mode.

## VISS INDEX SEARCH (ALARM SEARCH)

This function gives you quick access to the nearest index code in either direction. The recorder automatically marks index codes at the beginning of each recording initiated from the Stop or Timer Standby mode, as well as at the beginning of each alarm recording. You'll be able to access alarm recordings automatically when playing back tapes recorded with the ALARM REC switch set to ON.

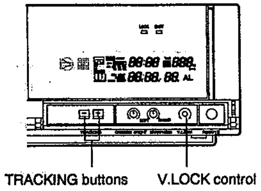
1. Set the VISS switch to "ON".
2. Press FF or REW in the Play, Still, or Stop mode.
   - VISS Index Search/Alarm Search will start in the corresponding direction. The "VISS" indication on the FDP will light.
   - If Index Search/Alarm Search was started from the Play or Still mode, the screen will show search pictures and playback will start automatically when the index code is located.
   - If Index Search/Alarm Search was started from the Stop mode, then the index code is detected in the Rewind or Fast-Forward mode. The tape stops when the index code is located.
3. To cancel VISS Index Search/Alarm Search, press STOP.

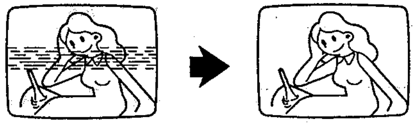


**NOTE:**
- This function will not operate during rewind in Auto Rewind mode and Repeat Recording/Playback mode.

## TRACKING CONTROL

- To minimise noise bars that may appear on-screen during normal or double-speed playback, press either TRACKING button until the best possible picture is obtained.
- To reset tracking to normal, press both TRACKING buttons simultaneously.
- To adjust tracking during still playback, press PAUSE/STILL a few more times to minimise noise bars.





## V. LOCK ADJUSTMENT

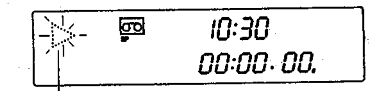
Vertical jitter in still or timelapse playback pictures can be corrected *with the V. LOCK control.*
- Turn in either direction to minimise jitter.

## NEXT-FUNCTION MEMORY

You can specify the mode you want to enter after rewind (Play, Timer Standby, Eject or Power Off) immediately after pressing the REW button.
If the VISS switch is set to ON, next-function memory operation takes place at the index point rather than tape-begin.

1. Press REW while in the Stop mode.
2. Press the corresponding button (PLAY/X2, TIMER, EJECT, or POWER) within 2 seconds.
   - At completion of rewind, the selected mode is entered automatically.
   - During rewind, the corresponding indicator (PLAY, TIMER, "Cassette loaded" indicator, or POWER button's LED) blinks.
   - To cancel the memory during rewind, press STOP for Play Memory, STOP, PLAY/X2, FF, or REW for Eject Memory, TIMER or POWER for Timer Standby Memory, or POWER for Power Off Memory.

**NOTE:**
- When the next-function memory is operating, the counter memory function is inoperative.



Blinks during rewind (for Play memory).

# TROUBLESHOOTING GUIDE

**POWER AND TAPE TRANSPORT PROBLEMS**

| Symptoms | Check points |
|---|---|
| Clock is functioning normally, but the VCR power cannot be turned on. | • Is "TIMER" displayed on the display panel?<br>— Press the TIMER button to cancel the Timer-Standby mode. |

**RECORDING PROBLEMS**

| Symptoms | Check points |
|---|---|
| Recording will not start. | • Is the cassette loaded?<br>• Has the cassette's safety tab been removed?<br>— Reseal the slot with adhesive tape. |
| Timer recording is not possible. | • Have you set the clock and programmed the timer correctly?<br>— Check again.<br>• Is "TIMER" displayed on the display panel?<br>— If not, press the TIMER button to display "TIMER". |

**PLAYBACK PROBLEMS**

| Symptoms | Check points |
|---|---|
| Tape is running but there is no playback picture. | • Is the monitor's input select switch set correctly?<br>• If you are using a TV receiver via AV connection, is it set to the "AV" mode?<br>— If not, set it to the "AV" mode. |
| Noise and jitter problems. | • Refer to "TRACKING CONTROL" and "V. LOCK ADJUSTMENT" ☞ p.32. |

**OTHERS**

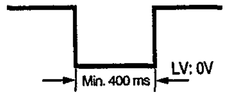
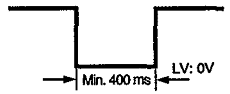
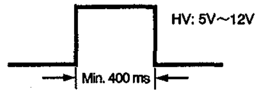
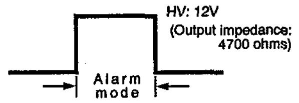
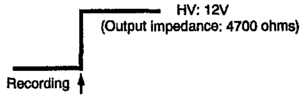
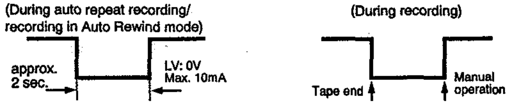
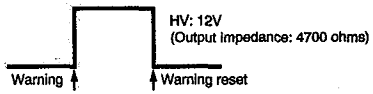
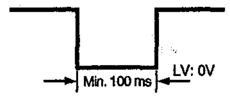
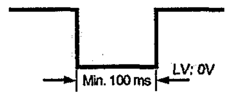
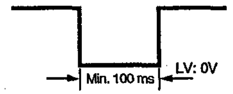
| Symptoms | Check points |
|---|---|
| Timer setting is not possible. | • Has the clock been set?<br>— Set the clock. |
| VISS Index Search does not function. | • Is the VISS switch set to ON?<br>— Set to ON. |

# ERROR INDICATION

When a malfunction occurs in the tape mechanism during loading or unloading, the power is automatically turned off and "ERR" appears on the display panel. (☞ p.13 "FLUORESCENT DISPLAY PANEL")

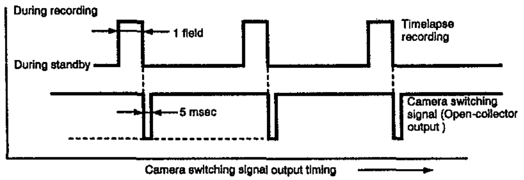
- The VCR will return to normal operation when the power is turned on again.
- If the "ERR" indication remains lit after the power is turned on again, it may indicate other malfunctions. In this case, consult your local JVC service agent.

# INPUT/OUTPUT TERMINAL SIGNAL LEVELS

| Terminal | Signal level | Remark |
|---|---|---|
| ALARM IN |   Min. 400 ms<br>LV: 0V | Input at ground level |
| ALARM OUT |   Min. 400 ms<br>LV: 0V | Through out of input signal |
| ALARM RST IN |   HV: 5V~12V<br>Min. 400 ms | Input at high level |
| ALARM REC OUT |   HV: 12V<br>(Output impedance: 4700 ohms)<br>Alarm mode | Output at high level |
| REC OUT |   HV: 12V<br>(Output impedance: 4700 ohms)<br>Recording | Output at high level |
| TAPE END OUT |   (During auto repeat recording/ recording in Auto Rewind mode)<br>approx. 2 sec.<br>LV: 0V<br>Max. 10mA<br>(During recording)<br>Tape end<br>Manual operation | Output at ground level |
| WARNING OUT |   HV: 12V<br>(Output impedance: 4700 ohms)<br>Warning<br>Warning reset | Output at high level |
| 1 SHOT REC IN |   Min. 100 ms<br>LV: 0V | Input at ground level |
| CLOCK RESET IN |   Min. 100 ms<br>LV: 0V | Input at ground level |
| CLOCK RESET OUT |   Min. 100 ms<br>LV: 0V | Output at ground level |

# CAMERA SWITCHING SIGNAL OUTPUT

The CAM SW OUT terminal on the rear panel outputs a switching timing signal to the connected sequential switcher. Switching interval can be set with on-screen setup menu page 6 "CAM SW"(☞ p.15 ).

| Terminal | Signal level | Remark |
|---|---|---|
| CAM SW OUT |  During recording<br>During standby<br>1 field<br>5 msec<br>Timelapse recording<br>Camera switching signal (Open-collector output)<br>Camera switching signal output timing | Output at ground level |

# SPECIFICATIONS

**GENERAL**
Power requirement : AC 220 — 240 V, 50/60 Hz
Power consumption : 34 W
Dimensions : 435 (W) X 124 (H) X 375 (D) mm
Weight : Approx. 8.0 kg
Temperature
Operating : 5°C to 40°C
Storage : –20°C to 60°C
Operating humidity : 30% to 80%
Format : VHS PAL standard
Tape speed : 23.39 mm/sec (SP, TL), 11.70 mm/sec (LP)
Recording and playback time : 3 (VHS SP), 6 (VHS LP), 24, 48, 72, 120, 168, 240, 480, 960 hours (with E-180/ cassette)

**VIDEO**
Signal system : PAL-type colour signal
Recording system
Luminance : FM recording
Colour : Down-converted direct recording
Input Line : 0.5 to 2.0 Vp-p, 75 ohms, unbalanced
Output Line : 1.0 Vp-p, 75 ohms, unbalanced
Horizontal resolution : 240 lines (colour)
300 lines (monochrome)
Signal-to-noise ratio : 43 dB

**AUDIO**
Number of tracks : 1
Input : –8 dBs, unbalanced
Output : –6 dBs, unbalanced
Frequency response : 100 Hz to 8 kHz
Signal-to-noise ratio : 40 dB (SP at 3% distortion)
Wow and flutter : Less than 0.35% RMS

**TIME/DATE GENERATOR**
Display : Day, month, year, hours, minutes, seconds, recording mode
Character size : 16 H
Power back up : Approx. one year

**ALARM**
Alarm input : Ground input
Alarm output : Alarm input throughout
Camera switching output : Negative pulse output (approx. 5 msec.)

**SERIES RECORDING**
Series input : Ground input, RCA
Series output : Series input, RCA

**ACCESSORIES**
Provided accessories : "R6/AA/UM-3" battery X 3
Power cord X 1

*E. & O.E. design and specifications subject to change without notice.*

# SECTION 1
# DISASSEMBLY

*Note: The numbers of screws shown on page 1-7 respectively accord with numbers of screws appearing in this section.*

## 1.1 REMOVAL OF ENCLOSURE PARTS

### 1.1.1 Top cover

(1) Remove four screws ①.

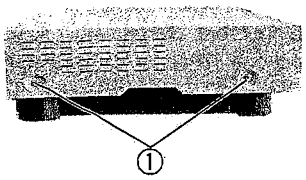


Fig. 1-1-1 Removal of Top caver 1

(2) Remove a screw ② and a screw ③.
(3) Lift up the rear side of the top cover while taking it off.

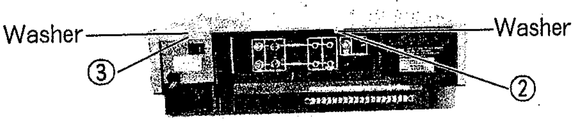


Fig. 1-1-2 Removal of Top caver 2

### 1.1.2 Bottom cover

(1) Place the set up side down.
(2) Remove seven screws ④ and a screw ⑤, and take off the bottom cover.

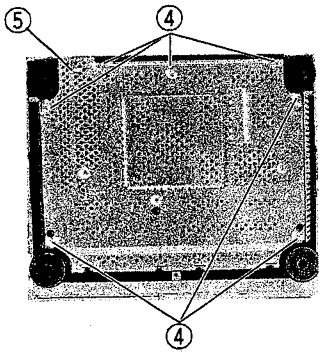


Fig. 1-1-3 Removal of Bottom cover

### 1.1.3 Front panel

(1) Take off the top cover referring to 1.1.1.
(2) Remove two screws ⑥, then remove respective feet.
(3) Release the front panel from six hooks (shown by Ⓐ) while removing the front panel.

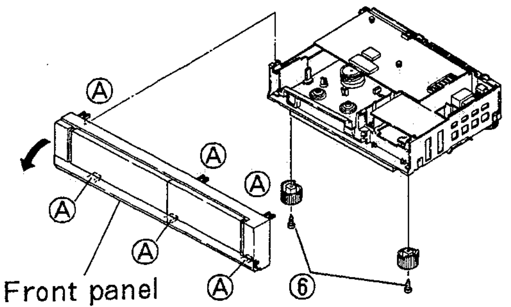


Fig. 1-1-4 Removal of Front panel

## 1.2 HOW TO OPEN MAIN BOARD

***Note:This condition is basic for proceeding to replace parts and to adjust the mechanism.***

(1) Take off the top cover.
(2) Remove two screws ⑦ and a screw ⑧-1.
(3) Open the MAIN board as shown in Fig. 1-2-2.

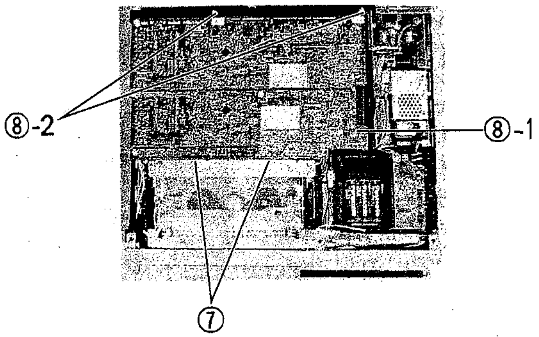


Fig. 1-2-1 How to open Main board 1

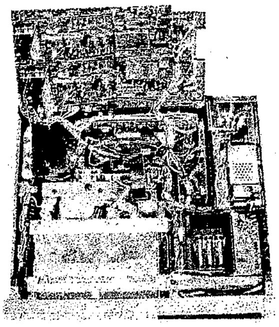


Fig. 1-2-2 How to open Main board 2

### 1.2.1 Removal of Main and Rear-1 board together with

(1) Take off the top cover.
(2) Remove two screws ⑦, a screw ⑧-1, two screws ⑧-2 and a screw ⑬ (see Fig. 1-2-1 and Fig. 1-2-3).
(3) Lift up the MAIN board and the REAR-1 board together with to remove them at a time (see Fig. 1-2-4).

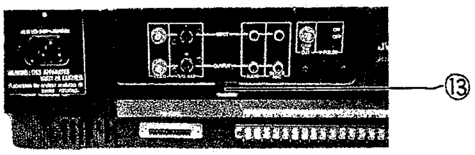


Fig. 1-2-3 Removal of Main and Rear-1 board 1

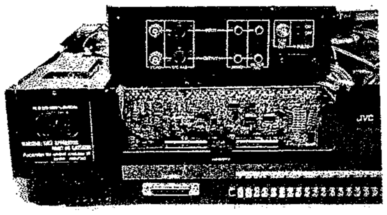
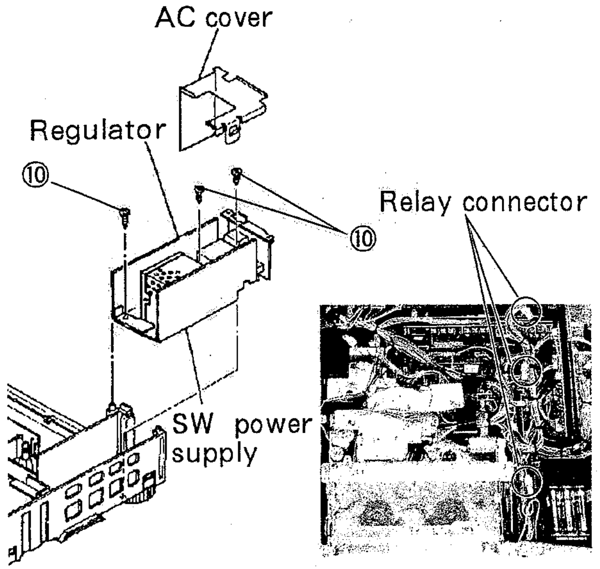
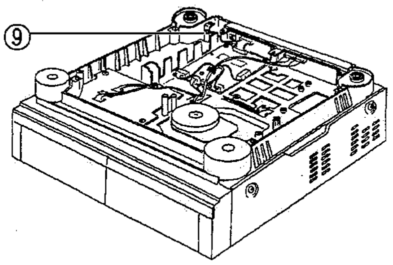
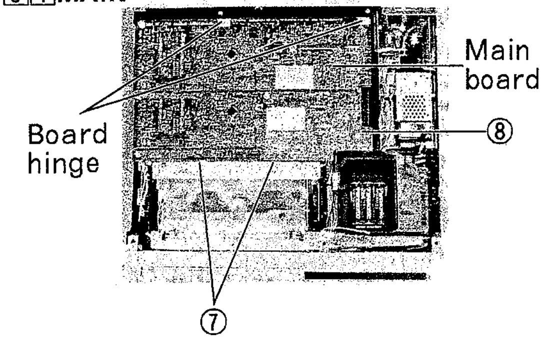
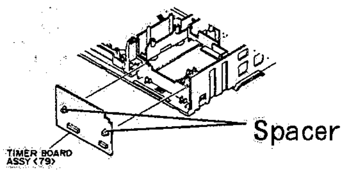
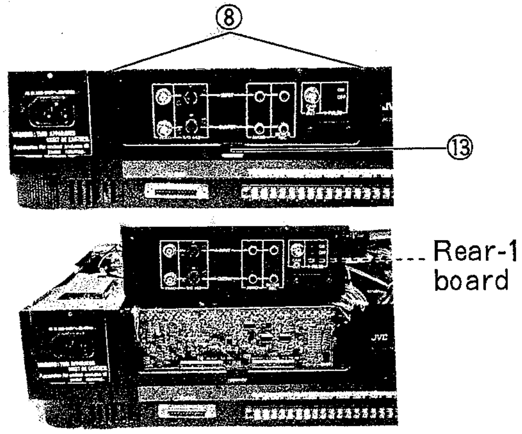
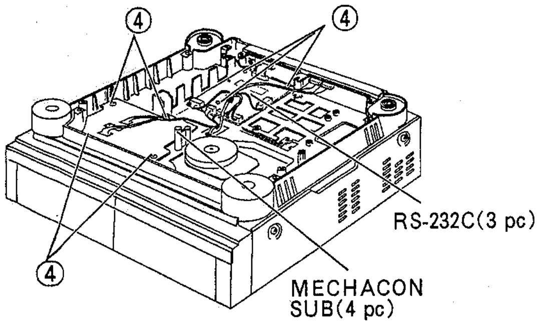
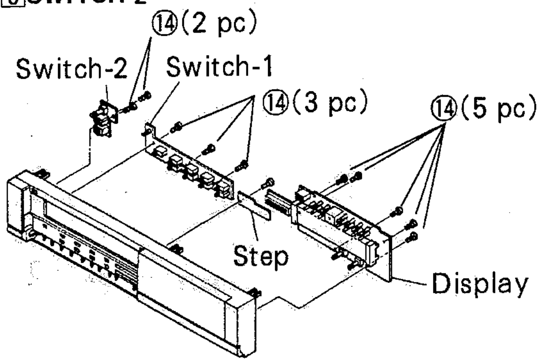


Fig. 1-2-4 Removal of Main and Rear-1 board 2

## 1.3 REMOVAL OF MAIN BOARDS

***Note:*** ***Whenever intending to remove or reinstall any board, make sure to disconnect the power cord. All boards that were removed or disconnected once must be reinstalled or reconnected as they were.***

| Group | Board Name | Removing Procedure |
|---|---|---|
| A | **01 SW POWER SUPPLY**<br>**02 REGULATOR**<br><br> AC cover<br>Regulator<br>⑩<br>Relay connector<br>⑩<br>SW power supply<br>Fig. 1-3-1 Removal of Power supply | (1) Take off the top cover. (Refer to 1.1.1.)<br>(2) Take off the AC cover.<br>(3) Take off the bottom cover. (Refer to 1.1.2.)<br>(4) Remove a screw ⑨ and the earth lug.<br>(5) Open the MAIN board. (Refer to 1.2.)<br>(6) Disconnect all connectors from the SW POWER SUPPLY board and the REGULATOR board (except CN1 of the SW POWER SUPPLY board).<br>(7) Disconnect three relay connectors of the earth lug of the power supply unit.<br>(8) Remove three screws ⑩ and lift the power supply unit upwards.<br>(9) Remove all screws retaining the two boards and release the boards from respective brackets for taking them out.<br><br> |
| B | **04 MAIN**<br><br> <br>Fig. 1-3-2 Removal of Main board | (1) Take off the top cover. (Refer to 1.1.1.)<br>(2) Remove two screws ⑦ and a screw ⑧.<br>(3) Disconnect all connectors from the MAIN board.<br>(4) Disengage board hinges from the chassis and take out the MAIN board. |
| C | **74 OS DATA／BATTERY-1**<br>**75 OS DATA／BATTERY-2** | (1) Take off the top cover. (Refer to 1.1.1.)<br>(2) Proceed to the procedure mentioned in 1.3.1 "Group C". |
| D | **05 D／C SERVO**<br>**06 T／L SERVO**<br>**07 MECHACON**<br>**10 VIDEO SUB**<br>**43 VIDEO PRE／REC** | (1) Take off the top cover. (Refer to 1.1.1.)<br>(2) Open the MAIN board. (Refer to 1.2.)<br>(3) Proceed to the procedure mentioned in 1.3.2 "Group D". |
| E | **79 TIMER**<br><br> <br>Fig. 1-3-3 Removal of Timer board | (1) Take off the top cover. (Refer to 1.1.1.)<br>(2) Take off the front panel. (Refer to 1.1.3.)<br>(3) Disconnect all connectors from the TIMER board.<br>(4) Remove the TIMER board from the board spacer to take out the board. |

| Group | Board Name | Removing Procedure |
|---|---|---|
| F | **76 REAR-1**<br><br> <br>Fig. 1-3-4 Removal of Rear-1 board | (1) Take off the top cover. (Refer to 1.1.1.)<br>(2) Take out the MAIN board. (Refer to the procedure for "Group B".)<br>(3) Remove two screws ⑧ and a screw ⑬, then lift the REAR-1 board upwards together with the terminals.<br>(4) Disconnect all connectors from the REAR-1 board.<br>(5) Unsolder the BNC, RCA and other connectors from the REAR-1 board, then take out the board. |
| G | **66 MECHACON SUB**<br>**95 RS-232C (optional: SA-K90E)**<br><br> <br>Fig. 1-3-5 Removal of Mechacon sub, RS-232C (optional) board | (1) Take off the bottom cover. (Refer to 1.1.2.)<br>(2) Disconnect all connectors from these boards.<br>(3) Remove screws ④ retaining the boards, and take out the boards respectively. |
| H | **77 DISPLAY**<br>**93 SWITCH-1**<br>**96 SWITCH-2**<br><br> ⑭(2 pc)<br>Switch-2<br>Switch-1<br>⑭(3 pc)<br>⑭(5 pc)<br>Step<br>Display<br>Fig. 1-3-6 Removal of Display, Switch-1, Switch-2 board | (1) Take off the top cover. (Refer to 1.1.1.)<br>(2) Take off the front panel. (Refer to 1.1.3.)<br>(3) Remove all screws retaining these boards.<br>(4) Disconnect all connectors from these boards.<br>(5) Release the respective boards from hooks for taking them out. |
| I | **92 OPERATION** | (1) Take off the top cover. (Refer to 1.1.1.)<br>(2) Take out the boards of the Group H, then separate the front panel from the main body.<br>(3) Proceed to the procedure mentioned in 1.3.3 "Group I". |

### 1.3.1 Group C

### 1. OS DATE/BATTERY-1, 2 boards

(1) Remove two screws ④.
(2) Disconnect all connectors from the respective boards.
(3) Move the boards rightwards while lifting it up for removing respectively.

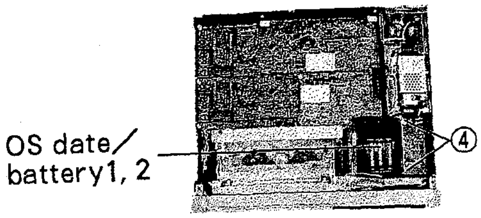


Fig. 1-3-7 Removal of Os date/Battery-1,2 board

### 1.3.2 Group D

### 1. D/C SERVO, T/L SERVO boards

(1) Disconnect all connectors from the respective boards.
(2) Lift the boards upwards for removing respectively.

### 2. MECHACON board

(1) Take out the MAIN board and the REAR-1 board. (Refer to 1.2.1.)
(2) Take out the D/C SERVO board and the T/L SERVO board.
(3) Disconnect all connectors from the MECHACON board.
(4) Disconnect the flat wire from the main deck.
(5) Remove three screws ④.
(6) Lift the rear side of the MECHACON board while sliding it in the direction of the rear of the set for taking it out.

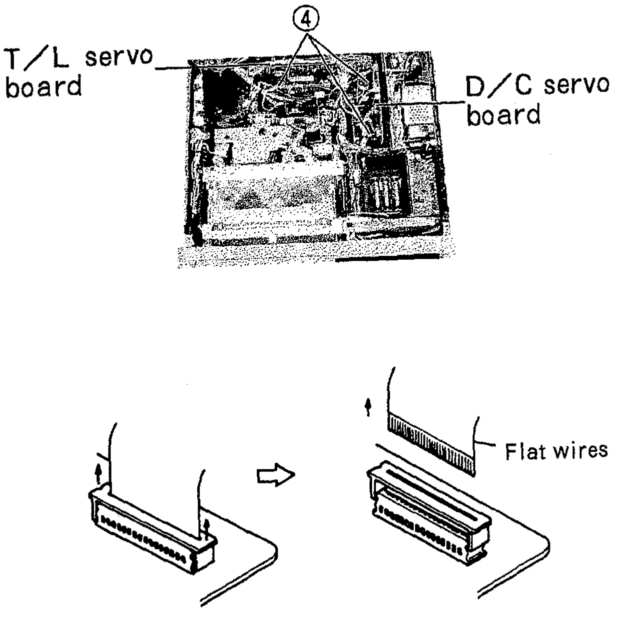


Fig. 1-3-8 Removal of Mechacon board

### 3. VIDEO SUB board

(1) Remove a screw ④ and detach the bracket.
(2) Disconnect all connectors from the board, and lift the board upwards while taking it out.

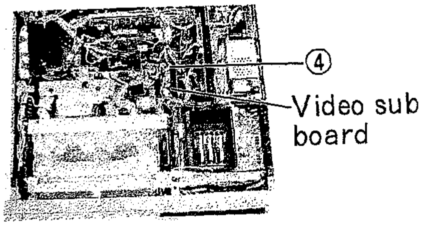


Fig. 1-3-9 Removal of Video sub board

### 4. VIDEO PRE/REC board

(1) Remove a screw ⑪ and detach the earth lug.
(2) Disconnect all connectors from the board.
(3) Remove two screws ⑫ and lift the board upwards while taking it out.

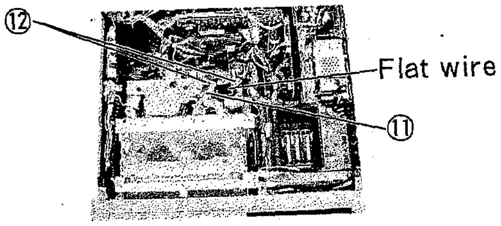


Fig. 1-3-10 Removal of Video PRE/REC board

### 1.3.3 Group I

(1) Disconnect the flat wire from the STEP board.
(2) Remove two screws ⑯ and detach the damper.
(3) Remove four screws ⑭ and detach the holders (2 pcs.).
(4) Move the shaft leftwards (in the direction of the POWER switch) while taking out the door assembly.
(5) Remove four screws ⑮ and disassemble the door.

***Note: Pay careful attention to pawls not to damage them at disassembly.***

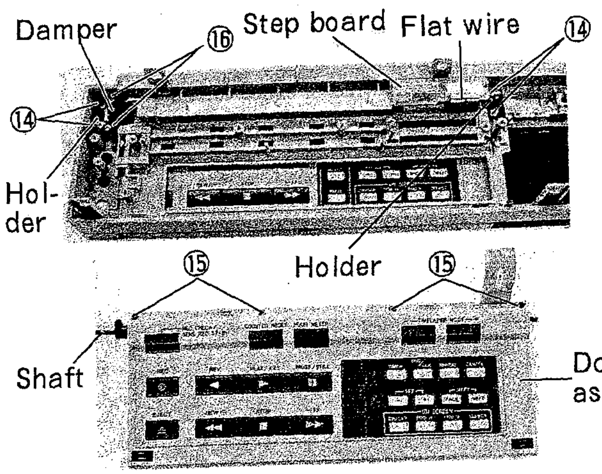
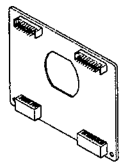


Fig. 1-3-11 Removal of Operation board

## 1.4 CHECKING OF D/C SERVO BOARD

The following figure shows the extension board to be used for check of the D/C SERVO board.
D/C SERVO extension board : PGJ05037 (also used for BR-9060E)

D/C SERVO extension board
PGJ05037



*Note: This extension board is provided for check only. Do not use it adjustment.*

### 1.4.1 Connection of extension board

(1) Take off the top cover. (Refer to 1.1.1.)
(2) Open the MAIN board. (Refer to 1.2.)
(3) Draw the D/C SERVO board out of the MECHACON board.

***Note: Draw out the board with care not to injure fingers since the board connectors are tightely connected with each other.***

(4) Connect the extension board to the MECHACON board, and connect the D/C SERVO board horizontally to it.
(5) Then, the soldered side of the D/C SERVO board is exposed for checking.

## 1.5 CHECKING OF TIME LAPSE SERVO BOARD

(1) Take off the top cover. (Refer to 1.1.1.)
(2) Take out the MAIN board and the REAR-1 board together with. (Refer to 1.2.1.)
(3) Then, the soldered side of the TIME LAPSE SERVO board can be checked from the rear of the set as shown in Fig. 1-5-1.

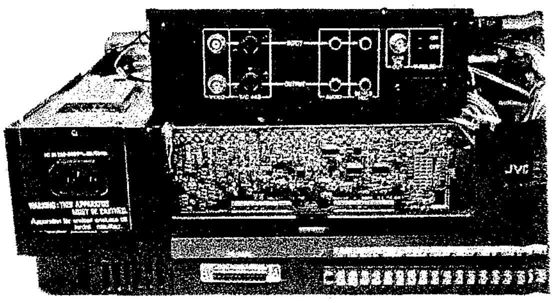
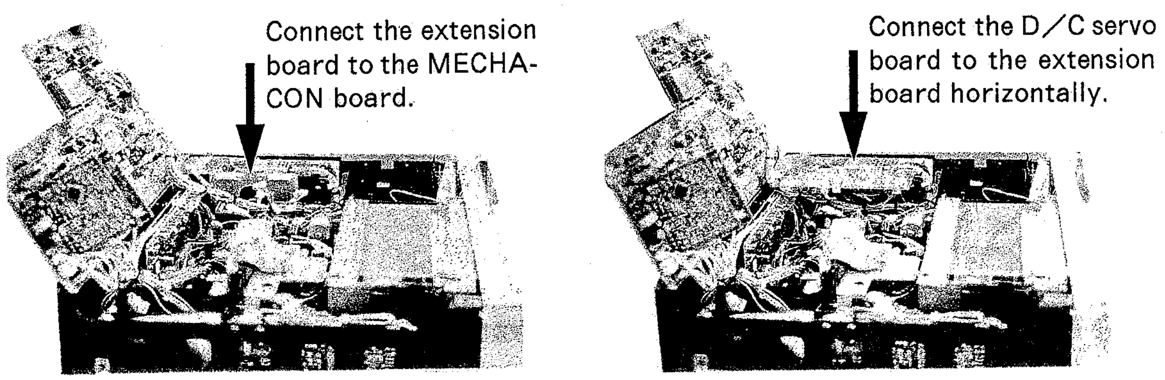


Fig. 1-5-1 Checking manner of T/L Servo board



Connect the extension board to the MECHACON board.

Connect the D/C servo board to the extension board horizontally.

Fig. 1-4-1 Checking manner of D/C Servo board

## 1.6 CONNECTION WITH VIDEO SWITCHER

### 1.6.1 Basic connection

***Note: For connection with the SW-501E/SW-502E, the set is required to have an 8-pin DIN plug and a 13-pin DIN plug.***

JVC special equipment division parts center

8-pin DIN plug : Part No. QMC0888-012
13-pin DIN plug : Part No. SSV1362-001

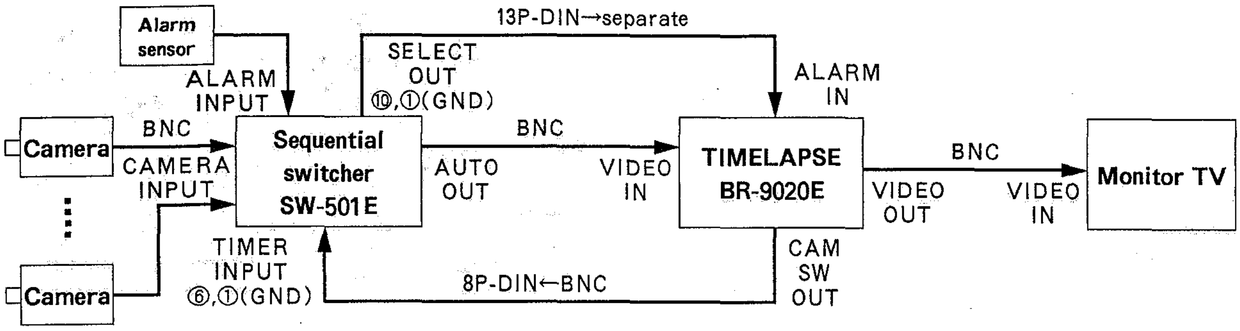

Alarm sensor
ALARM INPUT
13P-DIN→separate
SELECT OUT ⑩,①(GND)
ALARM IN
Camera
BNC
CAMERA INPUT
Sequential switcher SW-501E
BNC
AUTO OUT
VIDEO IN
TIMELAPSE BR-9020E
BNC
VIDEO OUT
VIDEO IN
Monitor TV
Camera
TIMER INPUT ⑥,①(GND)
8P-DIN←BNC
CAM SW OUT

Fig. 1-6-1 Connection diagram with SW-501E

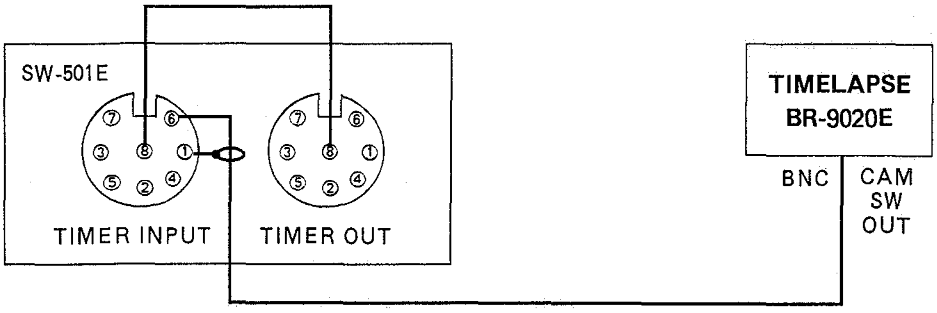

SW-501E
⑦ ⑥ ③ ⑧ ① ⑤ ② ④
⑦ ⑥ ③ ⑧ ① ⑤ ② ④
TIMER INPUT
TIMER OUT
TIMELAPSE BR-9020E
BNC
CAM SW OUT

Fig. 1-6-2 Connection of CAM SW OUT terminal with SW-501E

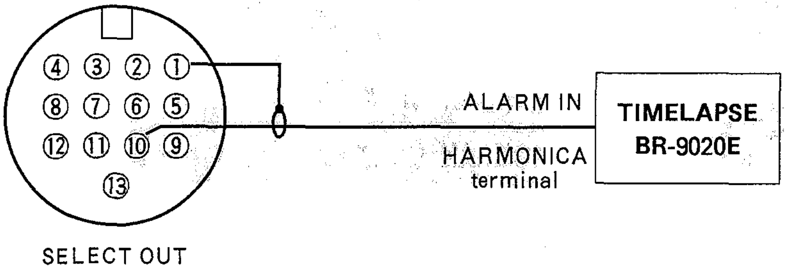

④ ③ ② ①
⑧ ⑦ ⑥ ⑤
⑫ ⑪ ⑩ ⑨
⑬
SELECT OUT
ALARM IN
HARMONICA terminal
TIMELAPSE BR-9020E

Fig. 1-6-3 Connection of ALARM IN terminal with SW-501E

## 1.7 REMOVAL OF DRUM COVER

(1) Take off the top cover. (Refer to 1.1.1.)
(2) Open the VIDEO board. (Refer to 1.2.)
(3) Remove a screw ⑰ and detach the shield plate from the drum cover.
(4) Remove a screw ⑱ and a screw ⑲, and detach the drum cover.

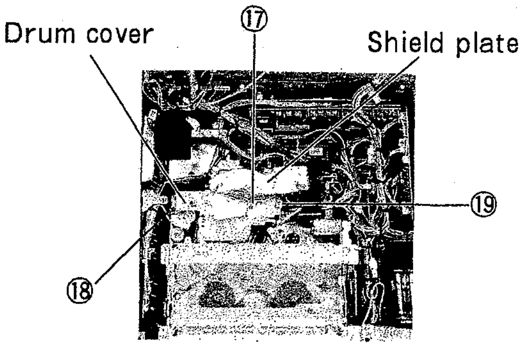
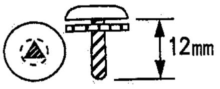
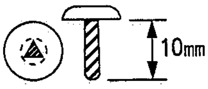
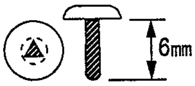
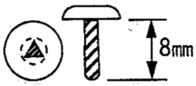
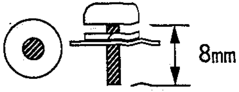
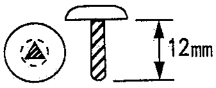
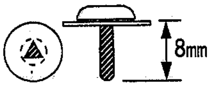
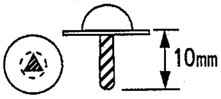
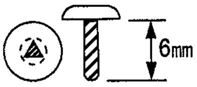
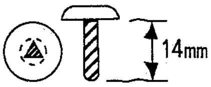
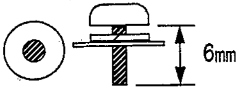
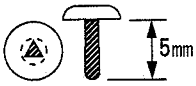
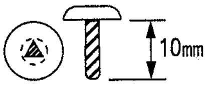
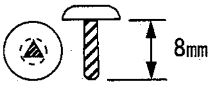
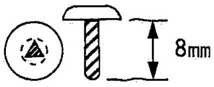
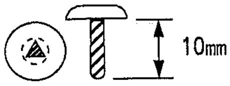
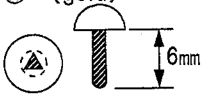
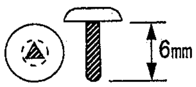
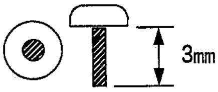

Drum cover
⑰
Shield plate
⑲
⑱

Fig. 1-7-1 Removal of Drum cover

## 1.8 TABLE OF SCREWS USED IN THIS SECTION

***Note: The numbers of screws shown below respectively accord with numbers of screws appearing in this section.***

| | | | | |
|---|---|---|---|---|
| ① (silver)<br> <br>PGD30030-07 (M4) | ② (silver)<br> <br>SDSF3010R | ③ (silver)<br> <br>SDST3006R | ④ (gold)<br> <br>SDSF3008Z | ⑤ (gold)<br> <br>DPSP3008Z |
| ⑥ (gold)<br> <br>SDSF3012Z | ⑦ (gold)<br> <br>PQ44003 (M2.6) | ⑧ (gold)<br> <br>GPSF2610Z | ⑨ (gold)<br> <br>SDST3006Z | ⑩ (gold)<br> <br>PQ43831-2 (M4) |
| ⑪ (gold)<br> <br>DPSP2606Z | ⑫ (gold)<br> <br>SDST2605Z | ⑬ (black)<br> <br>SDSF3010M | ⑭ (gold)<br> <br>SDSF2608Z | ⑮ (black)<br> <br>SPSF2008M |
| ⑯ (gold)<br> <br>SDSF2010Z | ⑰ (gold)<br> <br>SBST3006Z | ⑱ (gold)<br> <br>SDST2606Z | ⑲ (gold)<br> <br>PRD43990(M2) | |

# MATTERS TO CALL ATTENTION FOR USE OF THE TIMELAPSE VTR

## 1. ROUTINE INSPECTION IS REQUIRED

Although the BR-9020E is designed to be durable for a long period of service, there is a possibility of malfunction and failure. To use the set without troubles, it is recommended to do routine inspection once a month at least.

### 1.1 Procedure of routine inspection

(1) Turn on all the equipment of the surveillance system.
(2) Check that pictures appearing in all monitors are normal.
(3) Check that displayed date and time are correct.
(4) Perform new recording.
(5) Push the REC CHECK button.
(6) Check that the playback picture is normal.
(7) Check that the date and time were correct.

### 1.2 In case trouble is found in routine inspection

When something abnormal is found in routine inspection, not only turn off the power switch but also disconnect the power cord from the AC outlet, and immediately consult with the dealer or the nearest JVC service center about the trouble.

## 2. CLEANING OF HEADS

For cleaning the heads, use a cassette type dry cleaner obtainable in the market and clean the heads every 500 hours of use.

For a reference:
a .In case of 24-hour operation a day : 21 days approx.
b .In case of 12-hour operation a day : 42 days approx.
c .In case of 8-hour operation a day : 63 days approx.

## 3. REGARDING TAPE TO USE

(1) When a new tape is used for the first time, perform fast forwarding of the tape and rewinding it first in order to take in the slack of the tape.
(2) Replace a tape with a new one when it was used for 600 hours. The following table shows number of times that a E-180 cassette tape is used in different recording modes.
(3) If a tape is used for a period longer than the above limit, the magnetic material of the tape not only wears down but also gets the head soiled and clogged. This phenomenon causes video noise, and, if the worst comes to the worst, it makes recording and playback impossible.

| Recording mode | Number of usable times* |
|---|---|
| 960H | 1 time at maximum |
| 480H | 1 time at maximum |
| 240H | 2 time at maximum |
| 168H | 3 time at maximum |
| 120H | 5 time at maximum |
| 84H | 7 time at maximum |
| 72H | 8 time at maximum |
| 48H | 12 time at maximum |
| 24H | 25 time at maximum |
| 16H | 37 time at maximum |
| 6H (LP) | 100 time at maximum |
| 3H (SP) | 100 time at maximum |

*"1 time" is equivalent to a recording from the beginning to the end of a E-180 cassette tape.

# SECTION 2
# MECHANISM ADJUSTMENT

*Note: The numbers of screws and slit washers shown back of this section respectively accord with numbers of them appearing in this section.*

## 2.1 PREPARATION

### 2.1.1 Precautions

(1) When using a soldering iron, disconnect the power cord after heating it.
(2) When disconnecting connectors, do not pull connector cables by a strong force.
(3) Do not disturb adjusting parts such as screws thoughtlessly as there is a trouble of unknown reason.
(4) Unless otherwise indicated, use 10 : 1 probe.

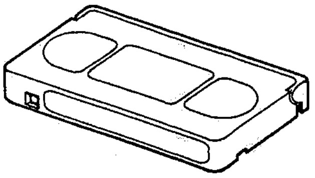
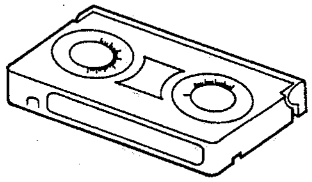
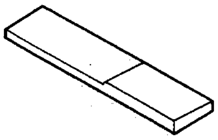
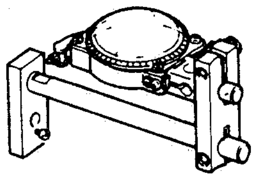
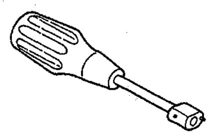
### 2.1.2 Mechanism operation check

For operating the mechanism without the cassette housing, prepare the mechanism as mentioned below.

(1) Disconnect the power cord from the AC outlet.
(2) Remove the cassette housing and disconnect connection of CN1 on the CASSETTE HOUSING board.
(3) Short-circuit between pin ① and pin ④ of CN1.
(4) Set an unlidded cassette on the main deck.
(5) Again connect the power cord to the AC outlet and select operation buttons.

### 2.1.3 Jigs and special tools for mechanism adjustment

For mechanism adjustment, the following jigs and special tools are required.

| Alignment tapes<br>MHPE,MH-2L,MBPE-X | Cassette torque meter<br>PUJ42881 | Parallel check plate<br>PUJ50204(0.1) | Microchecker<br>PUJ49712-2 |
|---|---|---|---|
|  |  |  |  |
| A/C head positioning driver<br>PUJ47351-2 | | | |
|  | | | |

- **General tools required besides above special tools**
- Nut-driver (5.5 mm)
- Hex. key (1.27 mm)
- Ordinary (+) screwdrivers [PGJ04037(3 mm), PGJ04038(2.6 mm)]

**Table 2-1-1 Special implements**

### 2.1.4 Specifications of alignment tapes

**·MHPE**

| Video signal | Audio signal | Application | Remark |
|---|---|---|---|
| VHS SP mode<br>Stairstep | 6kHz | ·For check adjustment of interchangeability.<br>·For adjustment of PB switching point. | MH-2 stairstep signal substitutable. |

·MH-2L

| No. | Play back time | Video signal | Audio signal | Application |
|---|---|---|---|---|
| 1 | 5 minute | VHS LP mode<br>Stairstep<br>(CH-1 only) | – | ·For check and adjustment of tracking preset.<br>·For check and adjustment of PB switching point. |
| 2 | 5 minute | VHS LP mode<br>Color bars | – | ·For check and adjustment of video PB circuits. |

**·MBPE-X**

| Video signal | Audio signal | Application | Remark |
|---|---|---|---|
| Stairstep<br>(1 field no-recording every 5 frames.) | 6kHz | For rough adjustment of X-value. | Only MHPE-X part name changed. |

## 2.2 PERIODIC REPLACEMENT OF MAIN PARTS

Periodic inspection and maintenance are needed in order to ensure performance and reliability. The following table has been compiled simply to give a general idea regarding maintenance and inspection.

In practice, the periods indicated will vary widely according to environmental and usage conditions. Also be aware that rubber parts may deform and age even when the equipment is not used.

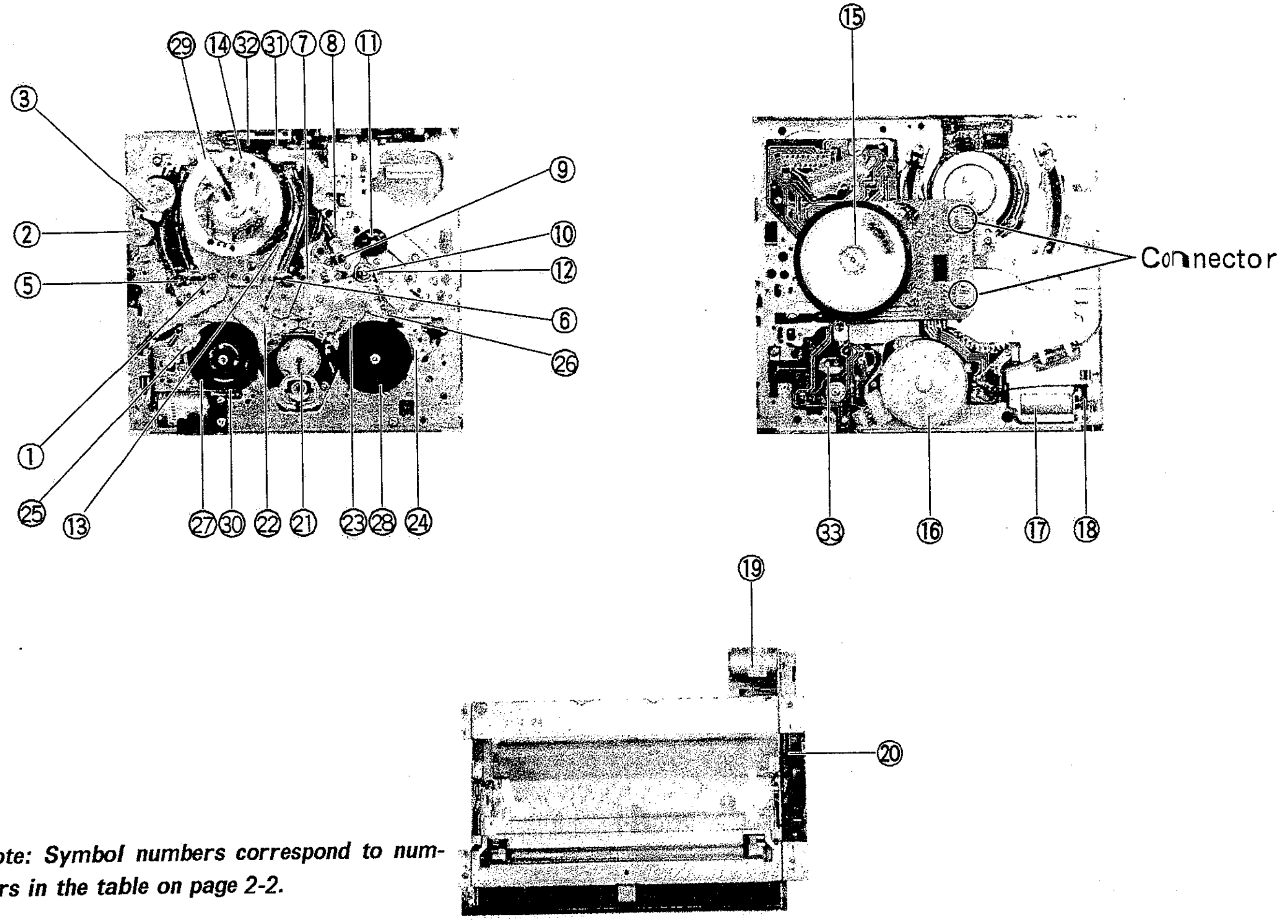
| | No. ＊1 | Part Name | Part No. | Standard service period ＊2 | | | | | | | | Ref. section |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | |
| Tape transport system | ① | Tension arm assy | PQ43710A | ★ | ★ | ★ | ● | ★ | ★ | ★ | ● | 2.3.11/ 2.5.1 |
| | ② | Impedance roller | PQ41955 | | | | ● | | | | ● | 2.3.19/ 2.7.2 |
| | ③ | Full erase head | PU57641-2 | | | | ● | | | | ● | 2.3.19 |
| | ⑤ | SP. pole base assy | PRD43905C | | | | ● | | | | ● | 2.3.8 |
| | ⑥ | T.U. pole base assy | PGZ01351 | | | | ● | | | | ● | 2.3.8 |
| | ⑦ | Half loading arm | PRD43100A | | | | ● | | | | ● | 2.3.23 |
| | ⑧ | A/C head | PU60560-2 | | | | ● | | | | ● | 2.3.6 |
| | ⑨ | T.U. guide pole<br>Lower flange | PU53629-3<br>PRD42998-01-01 | | | | ● | | | | ● | 2.3.23/ 2.7.4 |
| | ⑩ | Capstan shaft | — | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | — |
| | ⑪ | Pinch roller arm assy | PQ42006B-5 | ○ | ● | ○ | ● | ○ | ● | ○ | ● | 2.3.12 |
| | ⑫ | Guide arm assy | PQ32676A | ★ | ★ | ★ | ● | ★ | ★ | ★ | ● | 2.3.12 |
| | ⑬ | Drum assy | LDR2005A | ★ | ★ | ○ | ● | ★ | ★ | ○ | ● | 2.3.7 |
| | ⑭ | Upper drum assy | PDM2170E | ● | ● | ● | (●) | ● | ● | ● | (●) | 2.3.1/ 2.3.2 |
| Driving system | ⑮ | Capstan motor | PGZ01300 | | | | ● | | | | ● | 2.3.17 |
| | ⑯ | Reel motor | PGZ01332-01-01 | | | | ● | | | | ● | 2.3.20 |
| | ⑰ | Mode motor | PQ41996B | | | | ● | | | | ● | 2.3.22 |
| | ⑱ | Mode belt | PQM30003-20 | | ○ | | ● | | ○ | | ● | 2.3.22 |
| | ⑲ | Cassette motor | PQ42385A | | | | ● | | | | ● | 2.3.4 |
| | ⑳ | Cassette belt | PQM30003-19 | | ○ | | ● | | ○ | | ● | 2.3.5 |
| | ㉑ | Iidler arm | PU58645-1-4 | | ● | | ● | | ● | | ● | 2.3.21 |
| | ㉒ | SP. main brake | PQ42019B-6 | | ● | | ● | | ● | | ● | 2.3.13 |
| | ㉓ | T.U. main brake | PQ42020B | | ● | | ● | | ● | | ● | 2.3.13 |
| | ㉔ | T.U. sub brake | PQ42037A-2 | | ● | | ● | | ● | | ● | 2.3.15 |
| | ㉕ | SP. sub brake | PQ42021A-3 | | ● | | ● | | ● | | ● | 2.3.14 |
| | ㉖ | Reverse brake | PQ43778A | | ● | | ● | | ● | | ● | 2.3.16 |
| | ㉗ | SP. reel disk | PU59250-1-2 | | | | ● | | | | ● | 2.3.18 |
| | ㉘ | T.U. reel disk | PU58638-1-2 | | | | ● | | | | ● | 2.3.18 |
| Others | ㉙ | Brush assy | PDM4015B | | ● | | (●) | | ● | | (●) | 2.3.1 |
| | ㉚ | Tension band assy | PRD43319A | | ● | | ● | | ● | | ● | 2.3.10/ 2.5.1 |
| | ㉛ | Head cleaner | PRD40510-01-02 | ● | ● | ● | ● | ● | ● | ● | ● | 2.3.9 |
| | ㉜ | Heater assy | PDM4039C | | | | (●) | | | | (●) | — |
| | ㉝ | Mode select switch | PU59924 | | | | | | | | ● | 2.4.4 |

＊1 Symbol numbers correspond to numbers in Fig. 2-2-1.

＊2 Know the standard service time by hour meter.

★=Cleaning.
○=Check and Replace if necessary, or
Check and Clean.
●=Replacement, (●)=Included in Drum assy.

### 2.2.1 Location of main parts


㉙ ⑭ ㉜ ㉛ ⑦ ⑧ ⑪
③
②
⑤
⑨
⑩
⑫
⑥
㉖
①
㉕ ⑬
㉗ ㉚ ㉒ ㉑ ㉓ ㉘ ㉔
⑮
Connector
㉝ ⑯ ⑰ ⑱
⑲
⑳

*Note: Symbol numbers correspond to numbers in the table on page 2-2.*

Fig. 2-2-1

**Removal of Main-deck assembly**

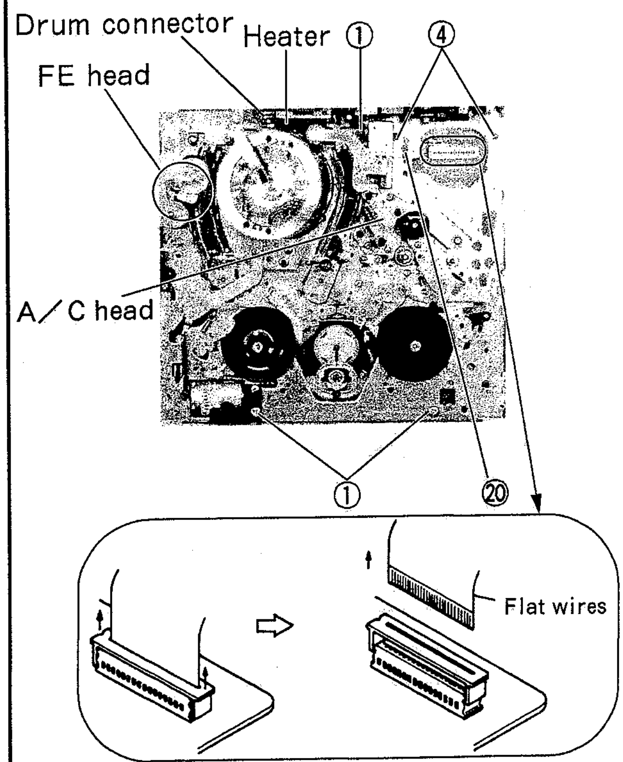
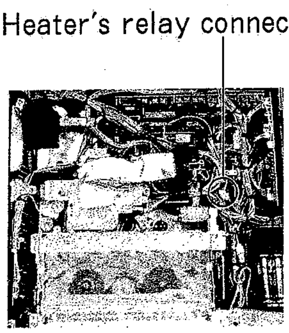
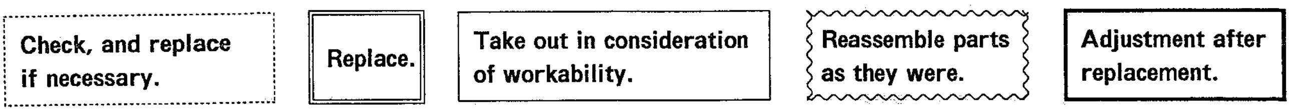

Drum connector
Heater
①
④
FE head
A/C head
①
⑳
Flat wires

Fig. 2-2-2

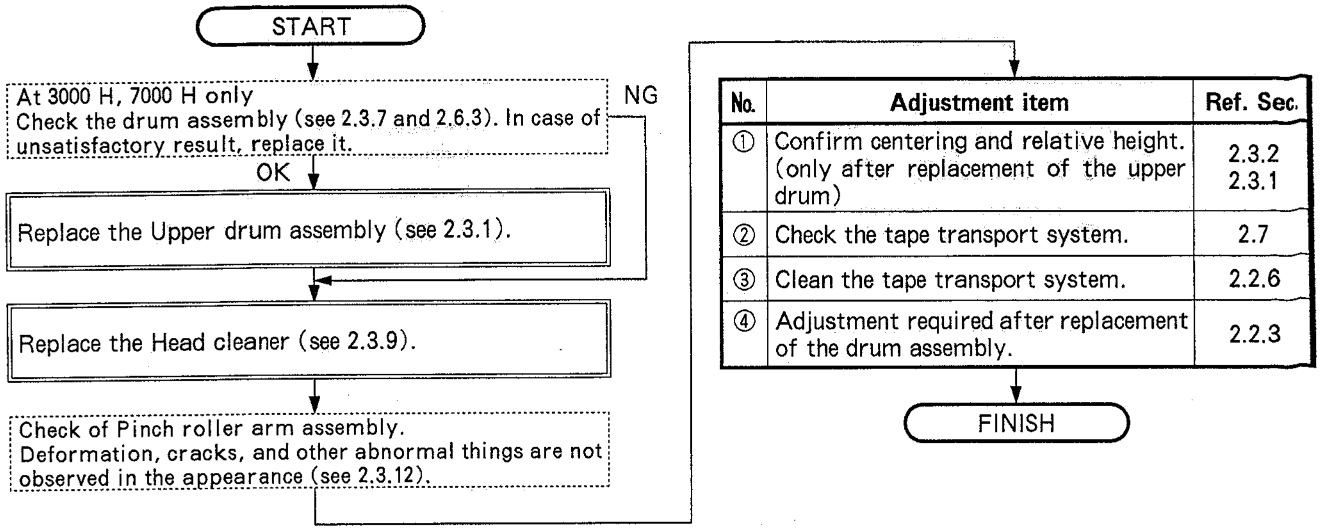
(1) Take off the top cover and the bottom cover. (See 1.1.)
(2) Disconnect the connectors from the capstan motor on the back side of the main deck. (See Fig. 2-2-1.)
(3) Remove the cassette housing assembly. (See 2.3.3.)
(4) Take off the drum cover. (See 1.7.)
(5) Remove the head cleaner assembly. (See 2.3.9.)
(6) Disconnect the wire from the A/C head.
(7) Pull out the both ends of the connector upwards while disconnecting the flat wire from the DECK TERMINAL board.
(8) Remove a screw ⑳ and the earth lug.
(9) Remove two screws ④ and lift up the VIDEO PRE/REC board vertically while removing it out of the main deck.
(10) Disconnect the connector from the FE head.
(11) Disconnect the relay connector of the heater assembly (see the figure below).
(12) Disconnect the connector from the drum assembly.
(13) Remove three screws ① and remove the main deck assembly.


Heater's relay connector

## 2.2.2 Maintenance step of main parts


Check, and replace if necessary.
Replace.
Take out in consideration of workability.
Reassemble parts as they were.
Adjustment after replacement.

### 1. 1000H, 3000H, 5000H and 7000H maintenance



At 3000 H, 7000 H only
Check the drum assembly (see 2.3.7 and 2.6.3). In case of unsatisfactory result, replace it.

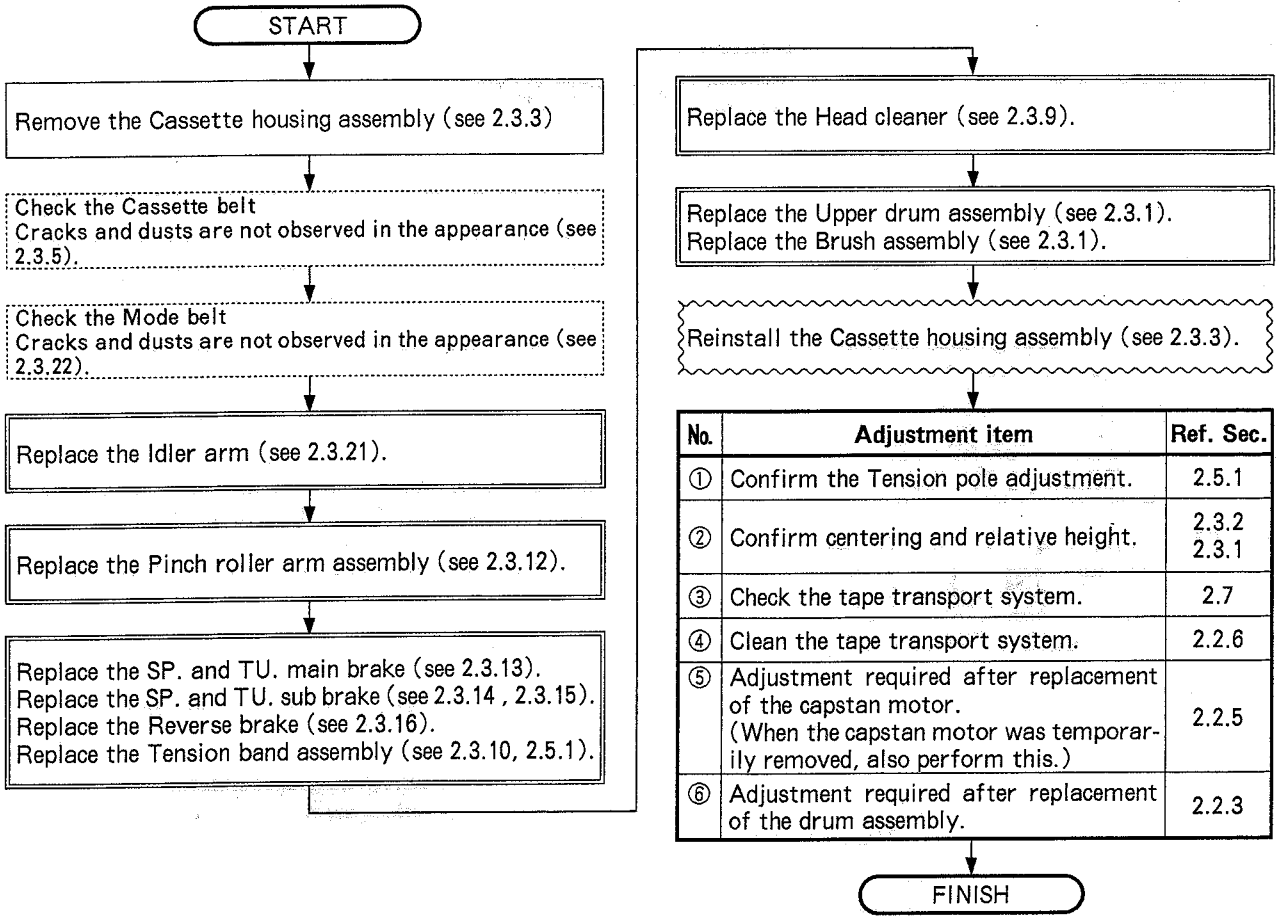
Replace the Upper drum assembly (see 2.3.1).

Replace the Head cleaner (see 2.3.9).

Check of Pinch roller arm assembly.
Deformation, cracks, and other abnormal things are not observed in the appearance (see 2.3.12).

| No. | Adjustment item | Ref. Sec. |
|---|---|---|
| ① | Confirm centering and relative height. (only after replacement of the upper drum) | 2.3.2<br>2.3.1 |
| ② | Check the tape transport system. | 2.7 |
| ③ | Clean the tape transport system. | 2.2.6 |
| ④ | Adjustment required after replacement of the drum assembly. | 2.2.3 |

### 2. 2000H and 6000H maintenance



Remove the Cassette housing assembly (see 2.3.3)

Check the Cassette belt
Cracks and dusts are not observed in the appearance (see 2.3.5).

Check the Mode belt
Cracks and dusts are not observed in the appearance (see 2.3.22).

Replace the Idler arm (see 2.3.21).

Replace the Pinch roller arm assembly (see 2.3.12).

Replace the SP. and TU. main brake (see 2.3.13).
Replace the SP. and TU. sub brake (see 2.3.14, 2.3.15).
Replace the Reverse brake (see 2.3.16).
Replace the Tension band assembly (see 2.3.10, 2.5.1).

Replace the Head cleaner (see 2.3.9).

Replace the Upper drum assembly (see 2.3.1).
Replace the Brush assembly (see 2.3.1).

Reinstall the Cassette housing assembly (see 2.3.3).

| No. | Adjustment item | Ref. Sec. |
|---|---|---|
| ① | Confirm the Tension pole adjustment. | 2.5.1 |
| ② | Confirm centering and relative height. | 2.3.2<br>2.3.1 |
| ③ | Check the tape transport system. | 2.7 |
| ④ | Clean the tape transport system. | 2.2.6 |
| ⑤ | Adjustment required after replacement of the capstan motor. (When the capstan motor was temporarily removed, also perform this.) | 2.2.5 |
| ⑥ | Adjustment required after replacement of the drum assembly. | 2.2.3 |

## 3. 4000H and 8000H maintenance

START

Remove the Cassette housing assembly (see 2.3.3).

Replace the Cassette belt (see 2.3.5).
Replace the Cassette motor (see 2.3.4).

Remove the Main-deck (see 2.2.1).

Remove the Capstan motor (see 2.3.17).
Remove the Reel motor (see 2.3.20).

Replace the Pinch roller arm assembly (see 2.3.12).
Replace the Guide arm assembly (see 2.3.12).

Replace the Mode motor (see 2.3.22).
Replace the Mode belt (see 2.3.22).

At 8000H only
Replace the Mode select switch (see 2.4.4).

Replace the Idler arm (see 2.3.21).

Replace the Capstan motor (see 2.3.17).
Replace the Reel motor (see 2.3.21).

Reinstall the Main-deck (see 2.2.1).

Remove the SP. and TU. main brake (see 2.3.13).
Remove the SP. and TU. sub brake (see 2.3.14 , 2.3.15).
Remove the Reverse brake (see 2.3.16).
Remove the Tension band assembly (see 2.3.10, 2.5.1).

Replace the SP. and TU. reel disk (see 2.3.18).

Replace the Tension arm assembly (see 2.3.11).

Replace the SP. and TU. main brake (see 2.3.13).
Replace the SP. and TU. sub brake (see 2.3.14 , 2.3.15).
Replace the Reverse brake (see 2.3.16).
Replace the Tension band assembly (see 2.3.10, 2.5.1).

Replace the Impdance roller (see 2.3.19 and 2.7.2).
Replace the Full erase head (see 2.3.19).

Replace the Half loading arm assembly (see 2.3.23).
Replace the A/C head (see 2.3.6).
Replace the TU. guide pole and Lower flange (see 2.3.23).

| No. | Adjustment item | Ref. Sec. |
|---|---|---|
| ① | Check the tape transport system. | 2.7 |
| ② | Clean the tape transport system. | 2.2.6 |
| ③ | Confirm the Tension band adjustment. | 2.5.1 |
| ④ | Adjustment required after replacement of the A/C head. | 2.2.4 |

Replace the Head cleaner (see 2.3.9).

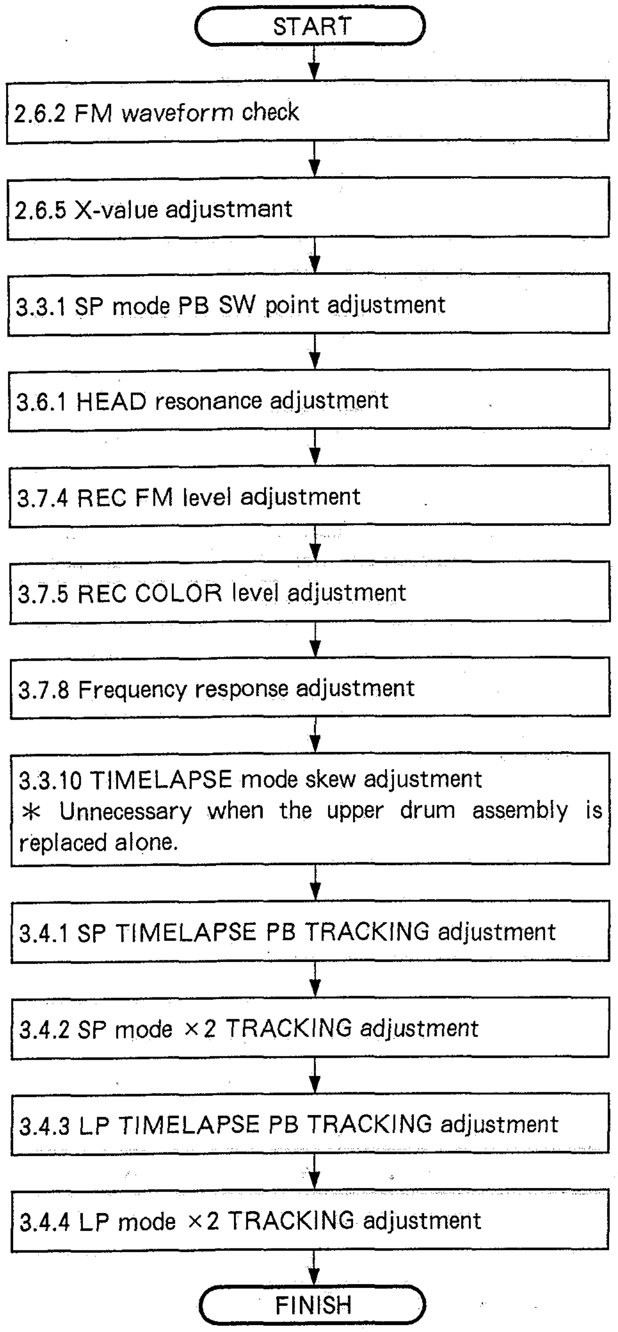
Replace the Drum assembly (see 2.3.7).
Replace the Pole base assembly (see 2.3.8).

Reinstall the Cassette housing assembly (see 2.3.3).

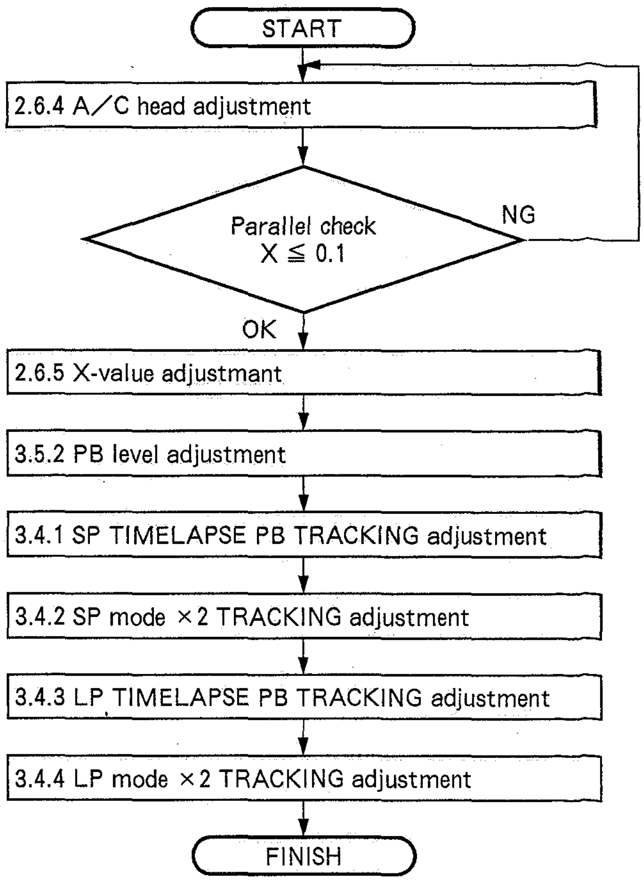
| No. | Adjustment item | Ref. Sec. |
|---|---|---|
| ① | Check the tape transport system. | 2.7 |
| ② | Clean the tape transport system. | 2.2.6 |
| ③ | Adjustment required after replacement of the capstan motor. | 2.2.5 |
| ④ | Adjustment required after replacement of the drum assembly. | 2.2.3 |

FINISH

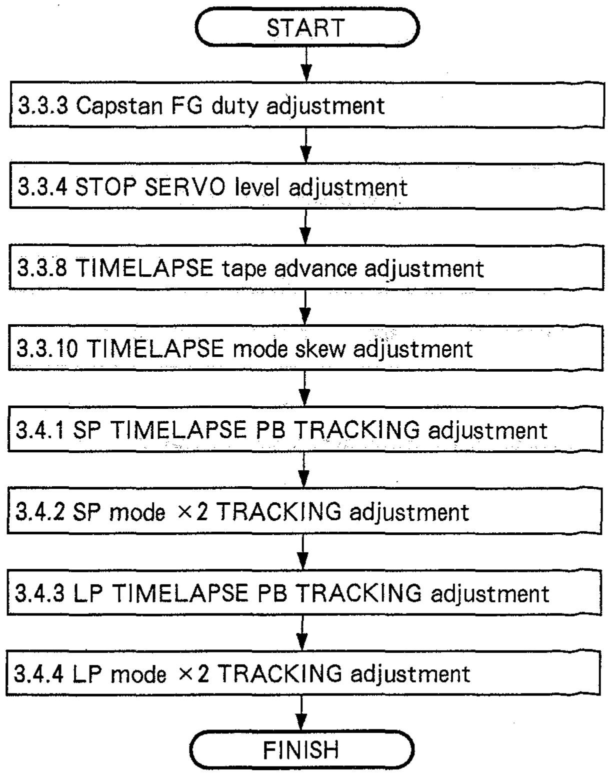
### 2.2.3 Adjustments required after replacement of drum assembly


START
2.6.2 FM waveform check
2.6.5 X-value adjustmant
3.3.1 SP mode PB SW point adjustment
3.6.1 HEAD resonance adjustment
3.7.4 REC FM level adjustment
3.7.5 REC COLOR level adjustment
3.7.8 Frequency response adjustment
3.3.10 TIMELAPSE mode skew adjustment
＊ Unnecessary when the upper drum assembly is replaced alone.
3.4.1 SP TIMELAPSE PB TRACKING adjustment
3.4.2 SP mode ×2 TRACKING adjustment
3.4.3 LP TIMELAPSE PB TRACKING adjustment
3.4.4 LP mode ×2 TRACKING adjustment
FINISH

### 2.2.4 Adjustments required after replacement of A/C head


START
2.6.4 A/C head adjustment
Parallel check
X ≦ 0.1
NG
OK
2.6.5 X-value adjustmant
3.5.2 PB level adjustment
3.4.1 SP TIMELAPSE PB TRACKING adjustment
3.4.2 SP mode ×2 TRACKING adjustment
3.4.3 LP TIMELAPSE PB TRACKING adjustment
3.4.4 LP mode ×2 TRACKING adjustment
FINISH

### 2.2.5 Adjustments required after replacement of capstan motor


START
3.3.3 Capstan FG duty adjustment
3.3.4 STOP SERVO level adjustment
3.3.8 TIMELAPSE tape advance adjustment
3.3.10 TIMELAPSE mode skew adjustment
3.4.1 SP TIMELAPSE PB TRACKING adjustment
3.4.2 SP mode ×2 TRACKING adjustment
3.4.3 LP TIMELAPSE PB TRACKING adjustment
3.4.4 LP mode ×2 TRACKING adjustment
FINISH

### 2.2.6 Cleaning

Although periodical cleaning of parts of the tape transport system is desirable, it is almost impossible to put it into practice. Therefore, it is strongly recommended to clean the tape transport system when a set is brought in to undergo repair and check. For cleaning use fine woven cotton cloth moistened with ethyl alcohol.

(1) Video heads
Dirty video heads get playback picture rough and invisible in the extreme case.
For cleaning the video head, lightly press quality paper moistened with ethyl alcohol to the upper drum by finger while turning the upper drum.
***Note: Since the video head is weak against vertical force (applied in the up-down direction), moving of cleaning paper may possibly damage the video head.***

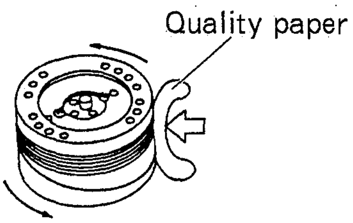


Fig. 2-2-3 Cleaning of Upper drum

(2) Tape guides
Dirty tape guides not only increase video heads in getting dirty much more but also cause damage to tape.

(3) Brush
Dirty and dusty brush causes horizontal snow noise in playback picture.

(4) A/C head and FE head
For cleaning them, scrub the head with an applicator moistened with ethyl alcohol.

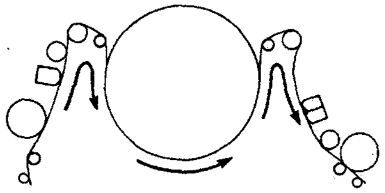


Fig. 2-2-4 Tape guides

### 2.2.7 Oiling and greasing

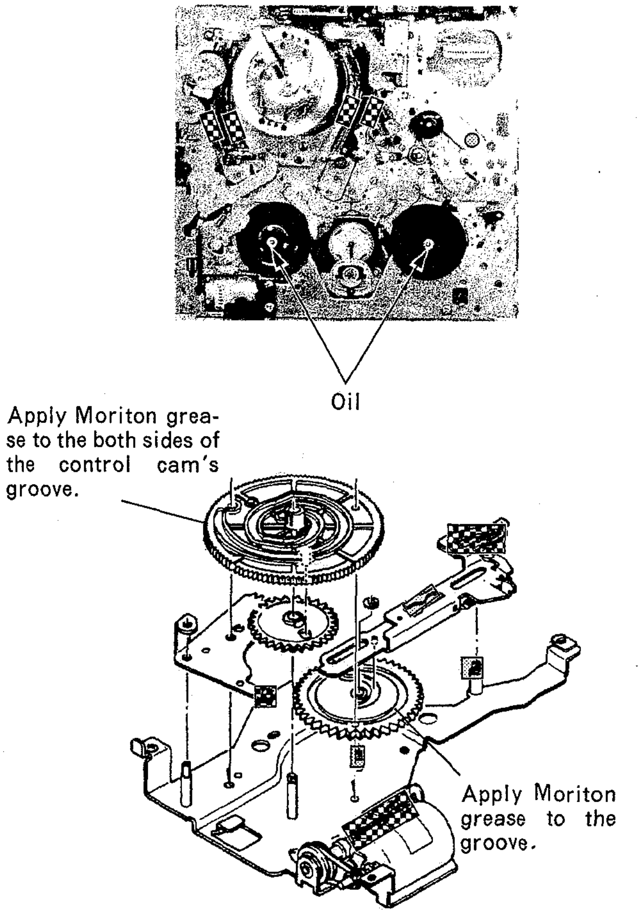
If oil or grease on the other party is old and dirty, wipe it off and apply new oil or grease to it, too.

(1) Oil and grease used for this set are as follows.

| Item | Name | JVC Part No. |
|---|---|---|
| Oil | Cosmo Hydro HV56 | COSMO-HV56 |
| <General spindle oil (low viscosity) is substitutable> | | |
| Grease | Moriton Grease (black) ▦ | MOS2-C |
| | Daphne Grease ▨ | DAPHNE-XLA-2 |

(2) Apply grease every 8000 hours of operation or taking an opportunity of parts replacement.

(3) Fig. 2-2-5 indicates places which need to apply oil or grease to.


Oil
Apply Moriton grease to the both sides of the control cam's groove.
Apply Moriton grease to the groove.

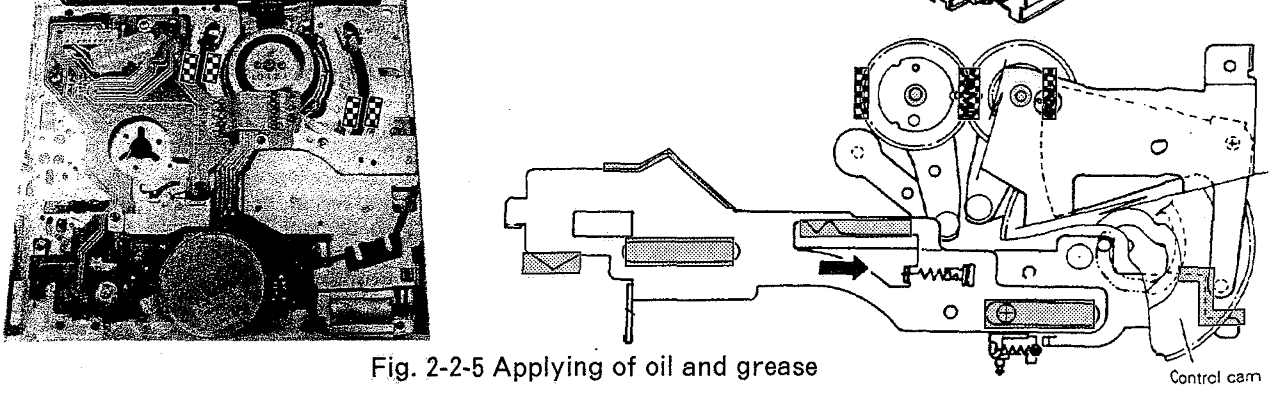
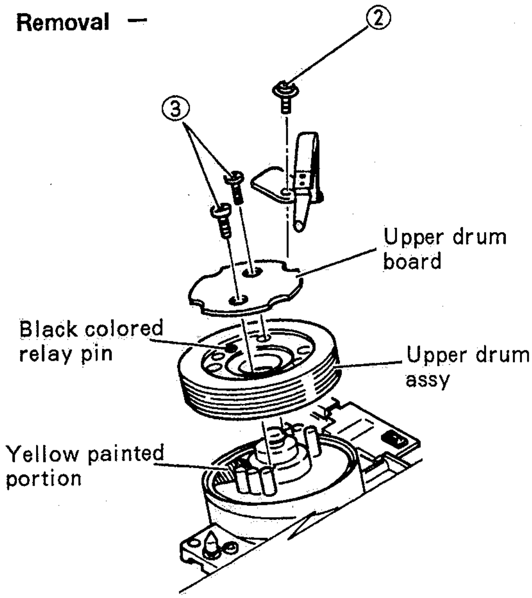
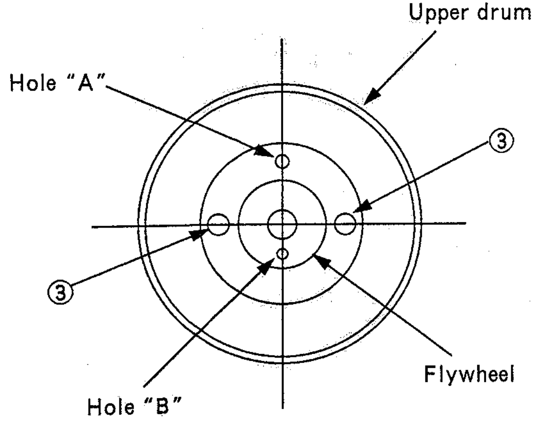
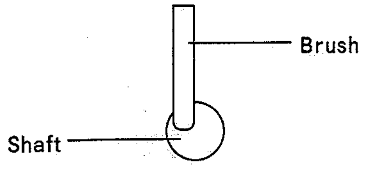


Fig. 2-2-5 Applying of oil and grease

## 2.3 REPLACEMENT OF MAIN PARTS

| No. | Item | Adjustment and Check |
|---|---|---|
| 1 | **Upper drum assembly**<br>**— Removal —**<br><br> ②<br>③<br>Upper drum board<br>Black colored relay pin<br>Upper drum assy<br>Yellow painted portion<br>Fig. 2-3-1 Removal of Upper drum | ***Note:*** ***• When re-installing the upper drum assembly, put it right down on the lower drum assembly with care not to touch the heads.***<br>***• For cleaning the heads, press quality paper moistened with alcohol to the drum head with fingers while turning the upper drum assembly counterclockwise. At that time, do not move cleaning paper nor the upper drum vertically to each other.***<br>(1) Remove one screw ② and take out the brush assembly.<br>(2) Unsolder the upper drum and remove all solder dusts by a solder absorber, etc.<br>(3) Remove two screws ③, then lift the upper drum together with the UPPER DRUM board upwards while removing the upper drum. Be very careful not to touch the drum head with fingers nor to damage it. |
|  | **— Reinstallation —**<br><br> <br>Fig. 2-3-2 Reinstallation of Upper drum<br><br> <br>Fig. 2-3-3 Reinstallation of Brush | ***Note:Proceed to the following reassembling very carefully not to touch and damage the drum head.***<br>(1) Clean the contact surfaces of the upper drum assembly and the lower drum assembly with alcohol.<br>***Note:Dusty contact surface causes maladjustment of the relative height of the heads. If the relative height of the heads is incorrect, the maximum levels of the CH-1 and CH-2 FM waveforms are observed different from each other when vary with the tracking control.***<br>(2) Install the upper drum assembly so that the hole "A" of the upper drum assembly and the hole "B" of the flywheel are positioned to each other at an angle of 180°<br>(3) Tighten two screws ③ evenly.<br>(4) Check right centering of the upper drum. (See 2.3.2.)<br>(5) Put the UPPER DRUM board on the upper drum assembly and solder the board.<br>(6) Clean the drum assembly on the whole (particularry the upper drum). (See 2.2.6.)<br>(7) Install the brush assembly so that it comes off the center of the drum shaft as shown in Fig. 2-3-3. |
|  | **— Check and Adjustment —** | (1) Check the relative height according to the following procedure.<br>① Set the alignment tape MHPE and connect an oscilloscope's probe with TP4 on 43VIDEO PRE/REC board while connecting its other probe with TP7 on 05D/C SERVO board for external trigger.<br>② Adjust the tracking control to confirm that waveforms of CH-1 and CH-2 simultaneously become maximum.<br>③ When they extremely differ from each other in the level or time, remove the upper drum to clean its bottom surface and the upper surface of the lower drum's flywheel. repeat the above steps reinstallation.<br>(2) Perform the adjustments required after replacement of the drum assembly as described in 2.2.3. |

| No. | Item | Adjustment and Check |
|---|---|---|
| 2 | **Centering of upper drum** | |

**If the upper drum is so installed as its center is off the center of the drum shaft, it causes jitters and other troubles. This matter (item) generally not check, however, when jittter remarkably appears in the picture, check neither wobbling in the upper drum rotation nor eccentricity of its shaft.**

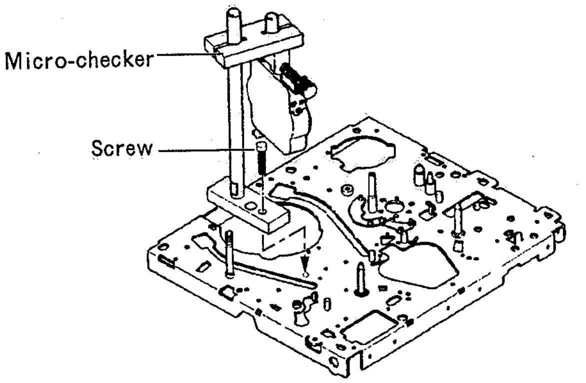


Fig. 2-3-4 Position of Microchecker installation

**Cautions to handle microchecker**

① Keep the microchecker out of any shock or vibration since it is high precision instrument.

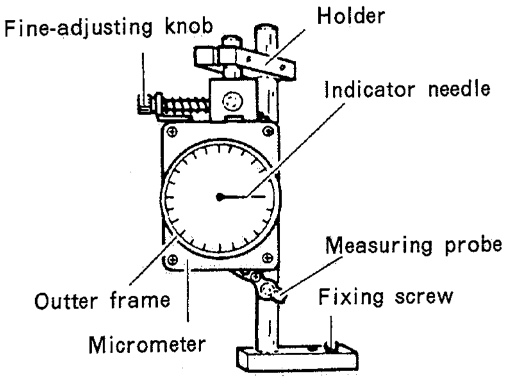
② Do not apply unnecessary force to the probe.

③ Although the outer ring of the micrometer is turnable approximately in a range of ± 10 graduations, do not turn it with strong force (more than 300g-cm).

④ Be careful not to touch the probe with video heads directly.

⑤ When setting the microchecker, make sure that the probe always orientates the center of the drum for working.

⑥ If rubbing or grating sound occurs in measuring, it results from abnormal contact of the probe. In such a case, check the upper drum and the tip of the probe whether dust or other contamination is on them, or not.



Microchecker : PUJ49712-2

*Note: For adjusting the upper drum in the centering, it is required to prepare a screw SDST3008Z to set a microchecker.*

(1) Remove the upper stay of the cassette housing assembly. (See 2.3.3.)

(2) Disconnect the power cord from the AC outlet, and apply opaque tape or the like onto the cassette LED (red LED in the center of the deck) to shut off infrared-rays.

(3) Turn the power on and set the mechanism to the Play mode. When the mechanism enters the loading end state, disconnect the power cord from the AC outlet.

(4) Prepare a microchecker and remove a hexagon head screw from its base.

(5) Fix the microchecker's base with a screw SDST3008Z at the position shown in Fig. 2-3-4.

(6) Carefully set the micrometer not to knock it against the upper drum.

(7) Slowly turn the micrometer's fine-adjusting knob clockwise until the indicator reads "0". The outer ring is usable for this adjustment in a range of ±10 graduations at maximum. Do not turn it further than this range.

(8) Being very careful not to apply any lateral pressure to the upper drum, turn it gently (with a paper string, for example). At that time, it is a minimum requirement that the pointer shakes in a range of ±1.5 micron.

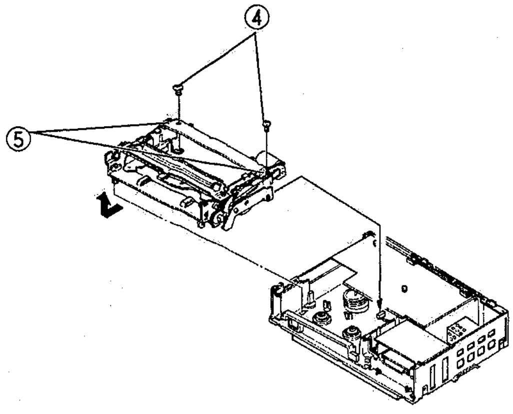
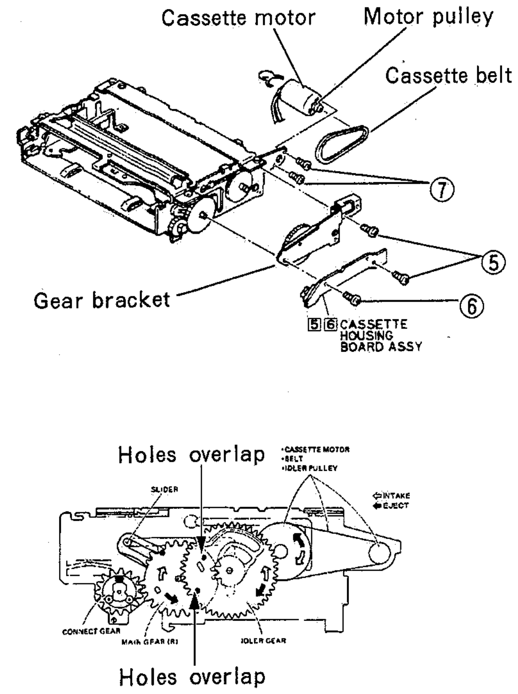
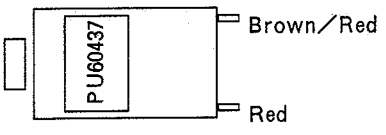
(9) If the pointer shakes more than ±1.5 micron, turn the micrometer's fine-adjusting knob counterclockwise to release the probe from contact. Loosen two screws retaining the upper drum while fine adjusting the setting position of the upper drum, then tighten the screws again.

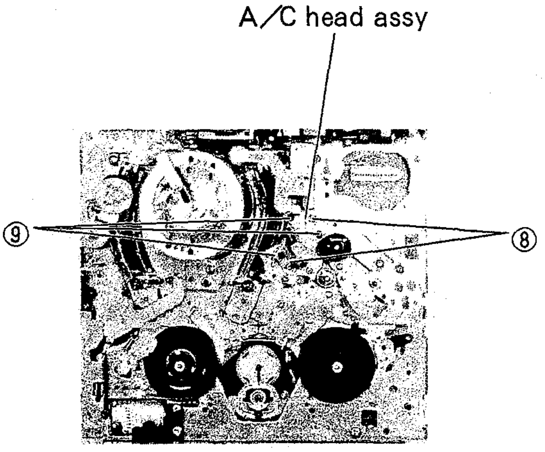
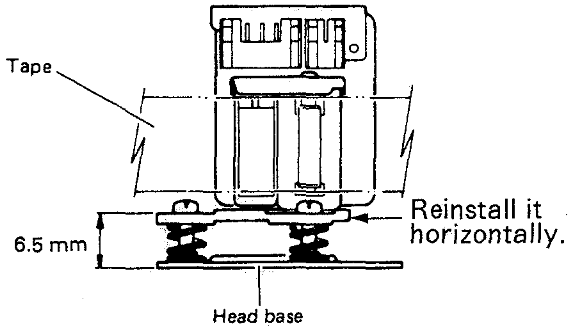
(10) Again check deflection in the center of the upper drum and adjust the centering until the micrometer's pointer just shakes in a range of ±1.5 micron.

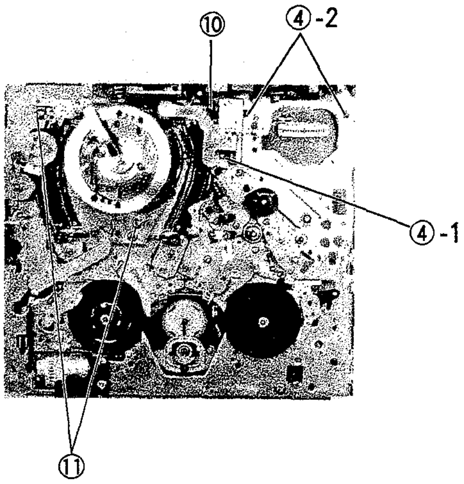
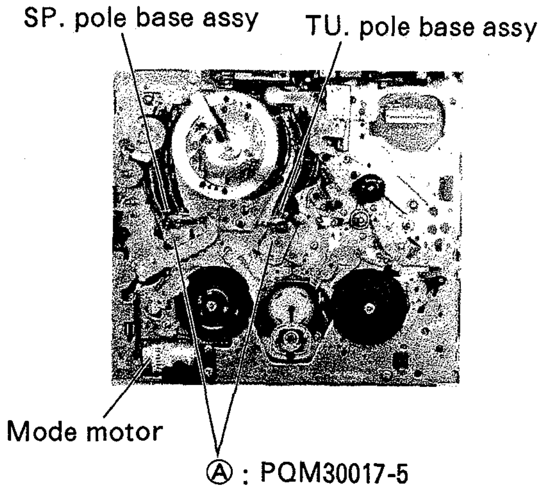
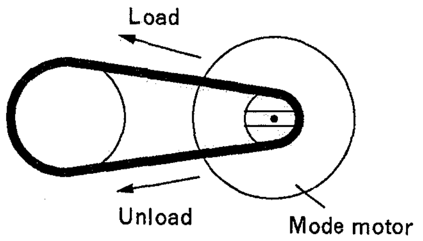
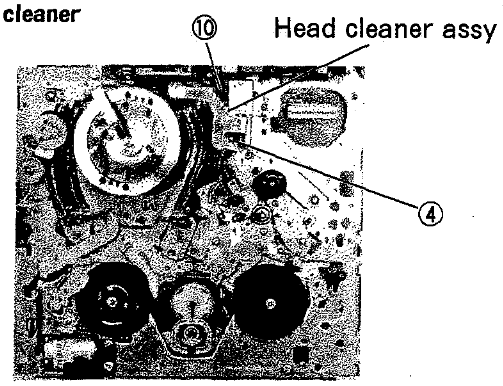
(11) Turn the microchecker's fine-adjusting knob counterclockwise, then remove it.

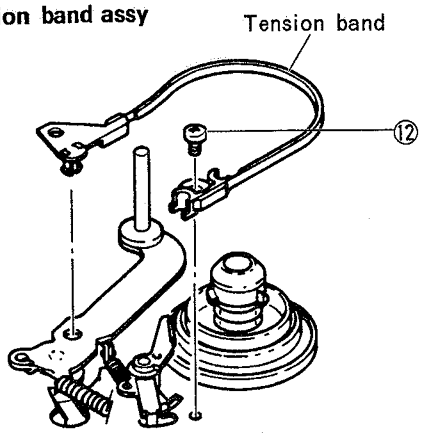
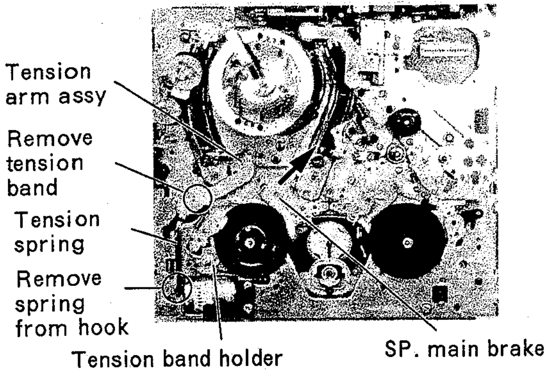
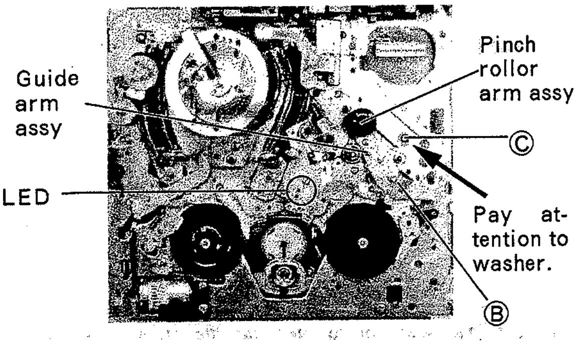
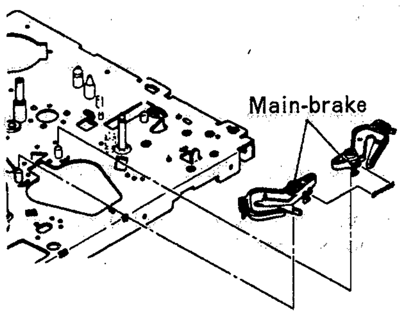
(12) Remove the tape (or the like) that was applied in the above step (2).

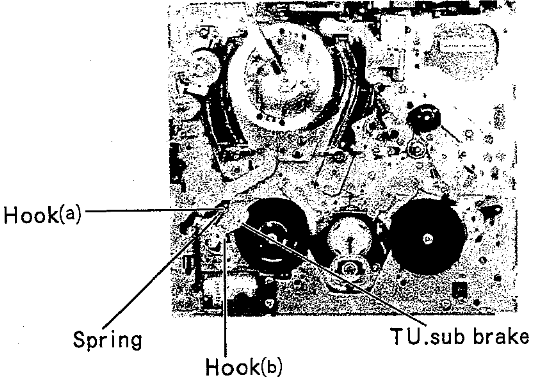
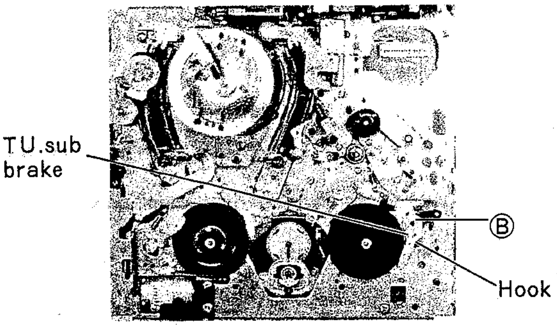
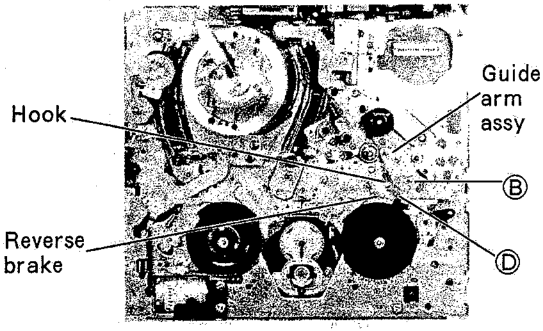
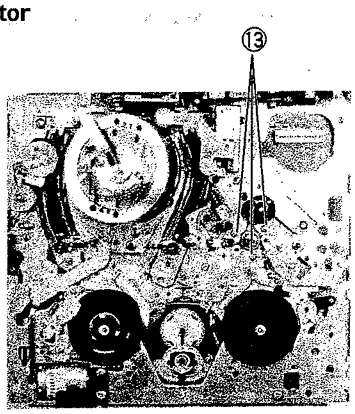
(13) Fit the upper stay to the cassette housing assembly.

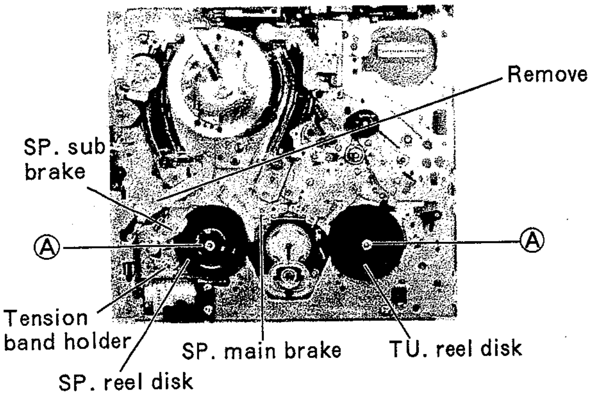
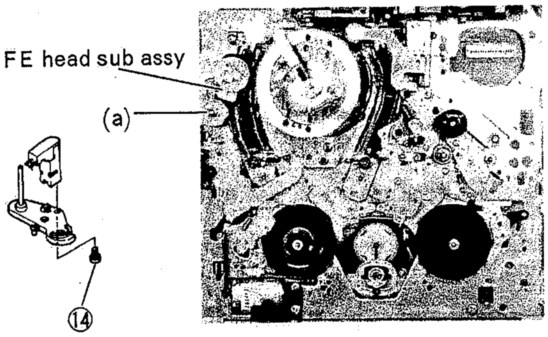
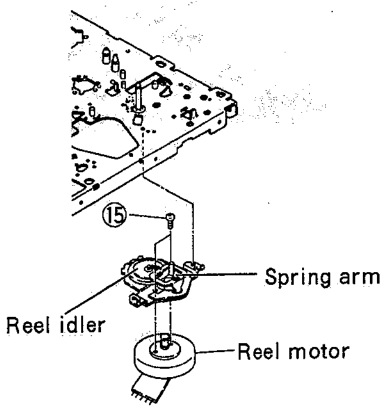
| No. | Item | Adjustment and Check |
|---|---|---|
| 3 | **Cassette housing assembly**<br><br> <br>Fig. 2-3-5 Removal of Cassette housing | (1) Take off the front panel. (See 1.1.3.)<br>(2) Open the MAIN board (see 1.2).<br>(3) Remove the earth lug from the cassette housing.<br>(4) Remove two screws ④.<br>(5) Disconnect the cassette housing connector, and pull the cassette housing assembly toward the front side while lifting it upwards for removing.<br>(6) For reinstalling the cassette housing assembly, do it in the reverse order of removing.<br>**- How to remove the upper stay of the cassette housing -**<br>(1) Remove two screws ⑤ and detach the stay. |
| 4 | **Cassette motor**<br><br> Cassette motor<br>Motor pulley<br>Cassette belt<br>⑦<br>⑤<br>Gear bracket<br>⑥<br>5 6 CASSETTE HOUSING BOARD ASSY<br>Holes overlap<br>•CASSETTE MOTOR<br>•BELT<br>•IDLER PULLEY<br>SLIDER<br>⇦INTAKE<br>⬅EJECT<br>CONNECT GEAR<br>MAIN GEAR (R)<br>IDLER GEAR<br>Holes overlap<br>Fig. 2-3-6 Removal of Cassette motor | (1) Take out the cassette housing assembly (see 2.3.3).<br>(2) Remove two screws ⑤ and a screw ⑥ and take out the gear bracket and cassette housing board together.<br>(3) Disengage the cassette belt from the motor pulley.<br>(4) Unsolder the wire connected with cassette motor.<br>(5) Remove two screws ⑦ and take out the cassette motor.<br>(6) For reinstalling the cassette motor, do it in the reverse order of removing.<br>(7) Engage the cassette belt with the motor pulley.<br>(8) Referring to Fig. 2-3-6, install the gear bracket paying attention to the holes overlap each gear.<br><br> PU60437<br>Brown/Red<br>Red<br>Fig. 2-3-7 Wiring of Cassette motor |
| 5 | **Cassette belt** | (1) See Fig. 2-3-6.<br>(2) Remove two screws ⑤ and a screw ⑥ and take out the gear bracket and cassette housing board together.<br>(3) Replace the cassette belt with new one.<br>(4) Referring to Fig. 2-3-6, install the gear bracket paying attention to the holes overlap each gear. |

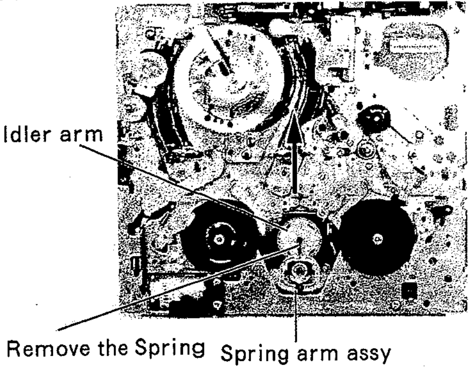
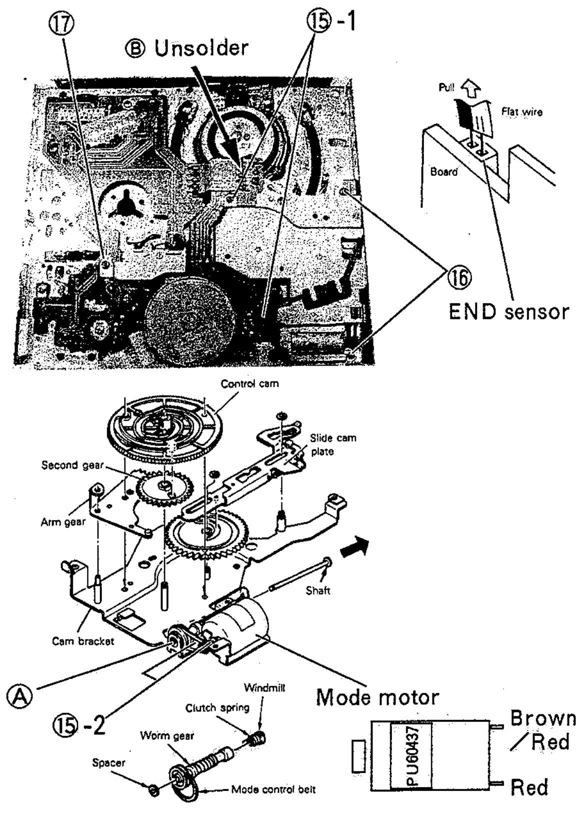
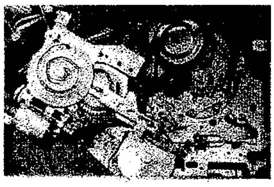
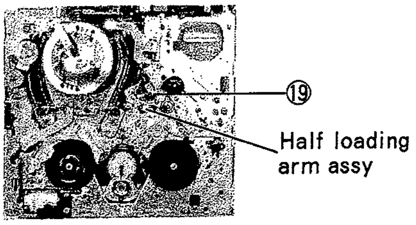
| No. | Item | Adjustment and Check |
|---|---|---|
| 6 | **A/C head assembly**<br>**— Removal —**<br> <br>Fig. 2-3-8 | (1) Disconnect the connector from the A/C HEAD board.<br>(2) Remove two screws ⑧ and take out the A/C head together with the head base.<br>(3) Unsolder the A/C head board and remove it.<br>(4) Remove three screws ⑨, then remove the A/C head with careful attention to three springs under the screw not to lose them. |
| | **— Reinstallation —**<br> <br>Fig. 2-3-9 | (1) Reassemble the A/C head and the peripheral parts in the reverse order of removing.<br>(2) Before setting the A/C head on the main deck, temporarily adjust the height of the A/C head as shown in Fig. 2-3-9. |
| | **— Check and Adjustment —** | (1) Perform the adjustments required after replacement of the A/C head assembly as described in 2.2.4. |

| No. | Item | Adjustment and Check |
|---|---|---|
| 7 | **Drum assembly**<br><br> <br>Fig. 2-3-10 | (1) Remove a screw ④-1 and a screw ⑩, then take out the head cleaner assembly.<br>(2) Pull out the both ends of the connector upwards while disconnecting the flat wire from the DECK TERMINAL board. (See 2.2.1.)<br>(3) There is the heater assembly installed inside the drum assembly. Disconnect the relay connector of the heater assembly. (See 2.2.1.)<br>(4) Remove two screws ④-2, then take out the VIDEO PRE/REC board.<br>(5) Remove two screws ⑪ and disconnect the connector from the drum assembly, then take out the drum assembly.<br>(6) Install a new drum assembly in the reverse order of disassembling mentioned above.<br>(7) Clean the drum. (See 2.2.6.)<br>(8) Perform adjustments required after replacement of the drum assembly. (See 2.2.3.) |
| 8 | **SP.,TU. pole base assy**<br><br> SP. pole base assy<br>TU. pole base assy<br>Mode motor<br>Ⓐ : PQM30017-5<br>Fig. 2-3-11 | (1) Remove the main deck assembly. (See 2.2.1.)<br>(2) Remove two slit washers Ⓐ.<br>(3) Remove the drum assembly. (See 2.3.7.)<br>(4) Turn the mode motor fully in the loading direction.<br>(5) Lift the pole base upwards while taking it out.<br>(6) Perform adjustments required after replacement of the drum assembly. (See 2.2.3.)<br><br> <br>Fig. 2-3-12 Rotational direction of mode motor |
| 9 | **Head cleaner**<br><br> <br>Fig. 2-3-13 | (1) Remove a screw ④ and ⑩ and take out the head cleaner assy.<br>(2) Press down the cleaner (sponge) a little while taking it out.<br>(3) Replace it with a new cleaner in the reverse order of removing. |

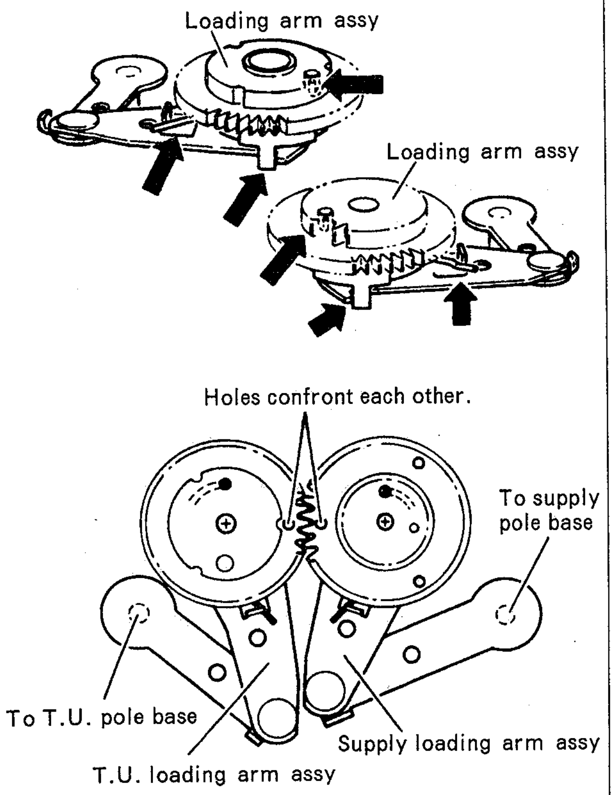
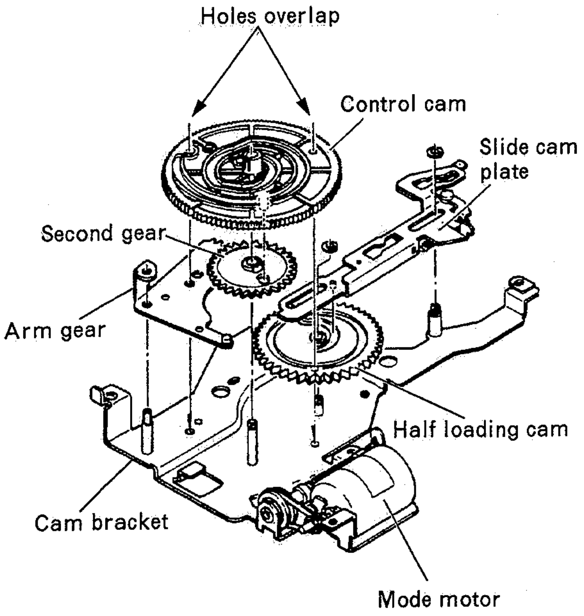
| No. | Item | Adjustment and Check |
|---|---|---|
| 10 | **Tension band assy**<br><br> Tension band<br>⑫<br>Fig. 2-3-14 | (1) Remove a screw ⑫ and pull the tension band out of the tension arm.<br>(2) Install a new tension band in the reverse order of removing.<br>(3) Check the position of the tension pole (see 2.5.1). |
| 11 | **Tension arm assy**<br><br> Tension arm assy<br>Remove tension band<br>Tension spring<br>Remove spring from hook<br>Tension band holder<br>SP. main brake<br>Fig. 2-3-15 | (1) Take out the cassette housing assembly (see 2.3.3).<br>(2) Disengage the tension spring from the hook of the main deck.<br>(3) Remove the tension band assembly from the tension arm assembly.<br>*Note: Do not remove and move the tension band holder.*<br>(4) Move the SP. main brake as shown by the arrow.<br>(5) Turn the tension arm fully in the unloading direction by finger while lifting it up to remove.<br>(6) Check the back tension (see 2.5.1). |
| 12 | **Pinch rollor arm assy**<br><br> Guide arm assy<br>LED<br>Pinch rollor arm assy<br>©<br>Pay attention to washer.<br>Ⓑ<br>Fig. 2-3-16 | (1) Disconnect the power cord from the AC outlet.<br>(2) Cover the cassette LED (in the center of the main deck) with a black cap of a ball-point pen, etc. to shut off infrared-ray.<br>(3) Turn on the power switch without cassette tape loaded, then set the mechanism to the PLAY mode, and then disconnect the power cord.<br>(4) Remove the slit washer Ⓑ:PQM30017-6 and tension spring, and take out the guide arm assembly.<br>(5) Remove the slit washer ©:PQM30017-28 and tension spring, and take out the pinch roller arm assembly. |
| 13 | **SP.,TU. Main brake assembly**<br><br> <br>Fig. 2-3-17 | *Note: This need not to take out the main deck assembly.*<br>(1) Lift the main brake assembly upwards with pliers or the like while taking it out.<br>(2) For replacement, install a new main brake assembly in the reverse order of removing. |

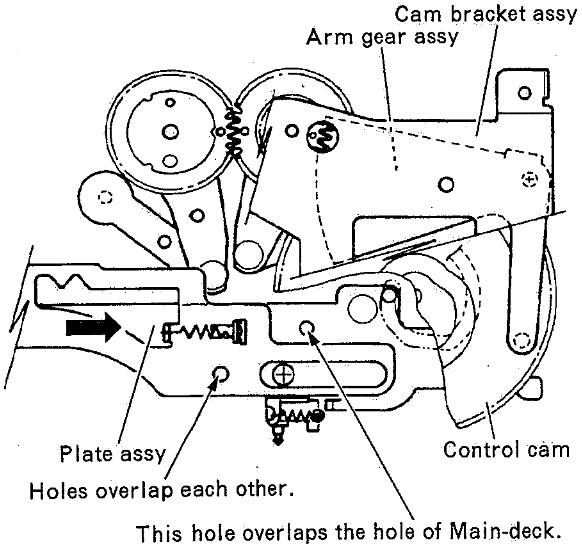
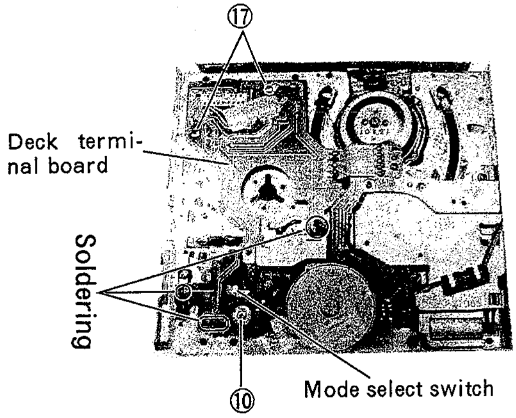
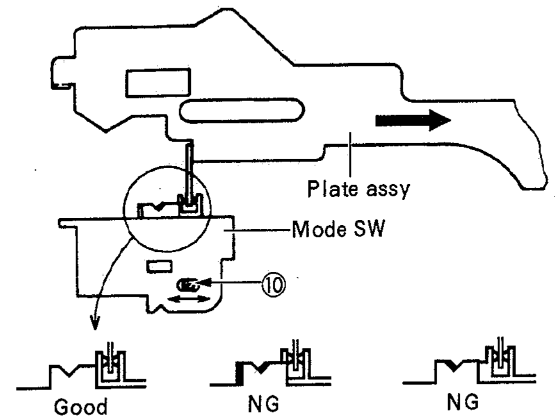
| No. | Item | Adjustment and Check |
|---|---|---|
| 14 | **SP. sub brake**<br><br> <br>Fig. 2-3-18 | (1) Take off the tension spring from hook (a) of main-deck.<br>(2) Take off the hook (b) and remove the SP. sub brake pulling upward. |
| 15 | **TU. sub brake**<br><br> <br>Fig. 2-3-19 | (1) Remove a slit washer Ⓑ:PQM30017-6.<br>(2) Take off the hook and remove the T.U. sub brake pulling upward. |
| 16 | **Reverse brake**<br><br> <br>Fig. 2-3-20 | (1) Take off the tension spring from hook of main-deck.<br>(2) Remove a slit washer Ⓑ:PQM30017-6 and tension spring, and take out the guide arm assy.<br>(3) Remove a slit washer Ⓓ:PQM30017-22 and take out the reverse brake. |
| 17 | **Capstan motor**<br><br> <br>Fig. 2-3-21 | ***Note: •This need not to take out the main deck assembly.***<br>***•Be careful not to damage the capstan shaft.***<br>(1) Take off the bottom cover. (See 1.1.2.)<br>(2) Disconnect the connector (see Fig. 2-2-1).<br>(3) Remove the upper stay of the cassette housing. (See 2.3.3.)<br>(4) Remove three screws ⑬ then replace the capstan motor.<br>(5) Again fit the cassette housing with the upper stay.<br>(6) Perform adjustments required after replacement of the capstan motor. (See 2.2.5.) |

| No. | Item | Adjustment and Check |
|---|---|---|
| 18 | **SP.,TU. reel disk**<br><br> Remove<br>SP. sub brake<br>Ⓐ<br>Ⓐ<br>Tension band holder<br>SP. main brake<br>TU. reel disk<br>SP. reel disk<br>Fig. 2-3-22 | **- Take-up reel disk -**<br>(1) Remove the slit washer Ⓐ:PQM30017-5 of the take-up side.<br>(2) Lift the take-up reel disk upwards while removing it.<br>(3) Apply a drop of COSMO HYDRO oil around the reel disk shaft.<br>**- Supply reel disk -**<br>(1) Remove the supply main brake.<br>(2) Remove the supply sub-brake.<br>(3) Disengage the tension band from the tension arm. Do not remove and move the tension band holder at that time.<br>(4) Remove the slit washer Ⓐ:PQM30017-5 of the supply side.<br>(5) Lift the supply reel disk upwards while removing it.<br>(6) Apply a drop of COSMO HYDRO oil around the reel disk shaft.<br>(7) After replacement, check the back tension. (See 2.5.1.) |
| 19 | **Full erase head**<br>**Impedance roller**<br><br> <br>Fig. 2-3-23 | (1) Remove the nut (a) first, then the impedance roller.<br>(2) Detach the full erase head together with the full erase head sub assembly.<br>(3) Remove the setscrew ⑭ and take out the full erase head.<br>(4) After replacement, adjust the height of the impedance roller. (See 2.7.2.) |
| 20 | **Reel motor**<br><br> <br>Fig. 2-3-24 | (1) Take off the bottom cover. (See 1.1.2.)<br>(2) Remove the cassette housing. (See 2.3.3.)<br>(3) Slide the spring arm to the right and left while inserting a screwdriver through it to remove two screws ⑮. At the same time remove soldering.<br>(4) Push the reel idler toward the drum while removing the reel motor. |

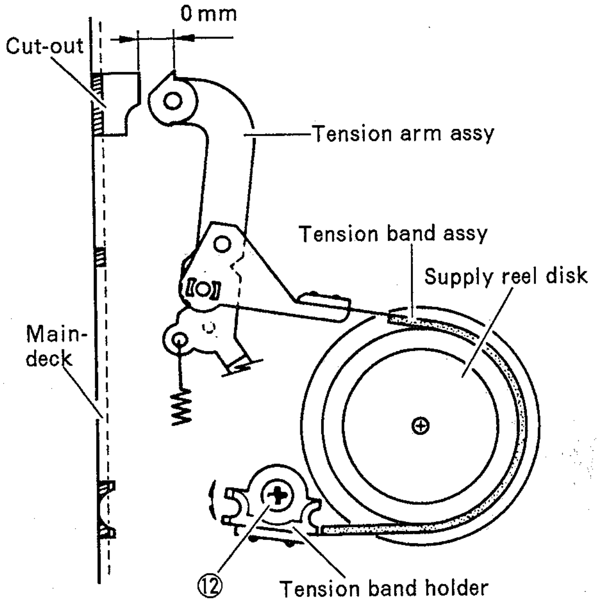
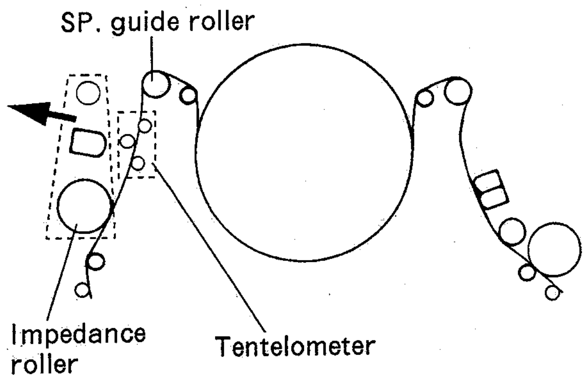
| No. | Item | Adjustment and Check |
|---|---|---|
| 21 | **Idler arm**<br><br> Idler arm<br>Remove the Spring<br>Spring arm assy<br>Fig. 2-3-25 | (1) Remove the SP. and TU. main brake (see 2.3.13).<br>(2) Remove the spring of the spring arm assy from the idler arm.<br>(3) Shift the idler arm as shown by the arrow and remove it.<br>***Note: When remove the idler arm do it in STOP state.*** |
| 22 | **Mode motor**<br>**Mode belt**<br><br> ⑰<br>⑮-1<br>Ⓑ Unsolder<br>Pull<br>Flat wire<br>Board<br>⑯<br>END sensor<br>Control cam<br>Slide cam plate<br>Second gear<br>Arm gear<br>Shaft<br>Cam bracket<br>Ⓐ<br>⑮-2<br>Windmill<br>Clutch spring<br>Worm gear<br>Spacer<br>Mode control belt<br>Mode motor<br>PU60437<br>Brown /Red<br>Red<br>Fig. 2-3-26 | (1) Remove the main deck assembly. (See 2.2.1.)<br>(2) Remove the capstan motor. (See 2.3.17.)<br>(3) Lift the flat wire of the end sensor upwards and disconnect it.<br>(4) Unsolder the flat wire at the point Ⓑ.<br>(5) Remove screws ⑮-1 (2 pcs), ⑯ (2 pcs) and ⑰ (1 pc), then place the cam bracket assembly up side down as shown in Fig. 2-3-27. (Leave the main deck as it was removed).<br>(6) Unsolder the mode motor wire.<br>(7) Remove two screws ⑮-2, and detach the mode motor.<br>(8) Install a new mode motor in the reverse order of disassembling.<br>(9) Remove a slit washer Ⓐ and pull out the shaft.<br>(10) Remove the worm gear and replace the mode belt.<br>(11) Engage a new mode belt in the reverse order of disengaging.<br>(12) Install the cam bracket assembly referring to the assembling manner of the mechanism (see 2.4).<br>Unsolder the flat wire at the point Ⓑ.<br><br>Fig. 2-3-27 |
| 23 | **Half loading arm assy**<br>**T.U. guide pole**<br><br> ⑲<br>Half loading arm assy<br>Fig. 2-3-28 | (1) Remove the A/C head together with the head base. (See 2.3.6.)<br>(2) Remove a screw ⑲ and take out the take-up guide pole.<br>(3) Lift the half loading arm assembly upwards while removing it.<br>(4) After replacement, make sure to do the following checks and adjustments.<br>① Check of the tape transport system (see 2.7.4).<br>② Cleaning of the tape transport system (see 2.2.6).<br>③ Check and adjustment required after replacement of the A/C head assembly (see 2.2.4). |

## 2.4 REASSEMBLING OF MECHANISM

| No. | Item | Adjustment and Check |
|---|---|---|
|  | **There is a close relation between the mode select switch (slide switch) and the mechacon circuit in the mechanism of this model, and mechanical operations of levers, gears, rollers and others mechanism parts are controlled by the condition of connection between the mode select switch and the control cam. Therefore, if those mechanism parts are incorrectly set, the mechanism may fall into malfunction. When reassembling, make sure to do all parts in the assembly position.** |  |
| 1 | **Loading arm**<br><br> Loading arm assy<br>Loading arm assy<br>Holes confront each other.<br>To supply pole base<br>To T.U. pole base<br>Supply loading arm assy<br>T.U. loading arm assy<br>Fig. 2-4-1 | (1) The loading arm assembly is composed of the loading gear, torsion spring and loading arm.<br>(2) Assemble the loading arm assembly properly referring to Fig. 2-4-1.<br>(3) When assembling the take-up loading arm assembly and the supply loading arm assembly, engage their gears so that the holes of them face each other. After they are assembled as shown in Fig. 2-4-1, leave them in that state for proceeding to further work.<br>(4) This position is the assembly position of the loading arm assembly. |
| 2 | **Control cam**<br><br> Holes overlap<br>Control cam<br>Slide cam plate<br>Second gear<br>Arm gear<br>Half loading cam<br>Cam bracket<br>Mode motor<br>Fig. 2-4-2 | (1) Install the half loading cam on the cam bracket assembly, then mount the slide cam plate assembly so that its pin sets into the inside of groove on the half loading cam.<br>(2) Install the arm gear assembly on the cam bracket assembly.<br>(3) Assemble the second gear and the control cam so that the pin of the control cam sets into the holes of the second gear.<br>(4) Mount the above assembly (control cam and second gear) on the cam bracket assembly to satisfy the relation indicated in figure. This position is the assembly position of the control cam.<br>(5) Do not turn the control cam from this position for next step. |

| No. | Item | Adjustment and Check |
|---|---|---|
| 3 | **Cam bracket assembly**<br><br> Cam bracket assy<br>Arm gear assy<br>Plate assy<br>Control cam<br>Holes overlap each other.<br>This hole overlaps the hole of Main-deck.<br>Fig. 2-4-3 | (1) Confirm the control cam and the loading arm assembly are positioned in the assembly position.<br>(2) Push the plate assembly rightwards to keep it in the position that its hole accords with the hole of the main deck. This position is the assembly position of the plate assembly.<br>(3) Then, install the cam bracket assembly. If the pin of the plate assembly is incorrectly set in the groove of the control cam, it makes impossible to install the cam bracket assembly right. |
| 4 | **Mode select switch**<br>**— Removal —**<br><br> ⑰<br>Deck terminal board<br>Soldering<br>⑩<br>Mode select switch<br>Fig. 2-4-4 | (1) Take out the main-deck assembly (see 2.2.1).<br>(2) Remove the capstan motor (see 2.3.17).<br>(3) Remove the cam bracket assembly (see step (3) and (4) of 2.3.22).<br>(4) Unsolder six points of the deck terminal board.<br>(5) Remove two screws ⑰ and take out the deck terminal board.<br>(6) Remove a screw ⑩ and take out the mode select switch. |
|  | **— Reinstallation —**<br><br> Plate assy<br>Mode SW<br>⑩<br>Good<br>NG<br>NG<br>The V-notches must be set in the same position in the assembly position.<br>Fig. 2-4-5 | ***Note: This adjustment is needed when the mode select switch was removed once or its setting position is changed.***<br>(1) Engage the plate assembly and the mode select switch with each other as shown in Fig. 2-4-5, then tighten the screw ⑩ so lightly as the mode select switch can be moved sidewards.<br>(2) Press the plate assembly rightwards so as to accord the holes shown in Fig. 2-4-3 with each other, and fix them temporarily with a precision screwdriver or the like.<br>(3) If the cam bracket is already installed, turn the mode motor to accord the holes.<br>(4) Move the mode select switch sidewards in order to align the upper and lower notches on a straight line, and tighten the screw ⑩ to fix the switch.<br>(5) After removing the precision screwdriver, etc., install the DECK TERMINAL board and solder it.<br>(6) Perform adjustments required after replacement of the capstan motor (see 2.2.5). |

## 2.5 TAPE TENSION ADJUSTMENT

| No. | Item | Adjustment and Check |
|---|---|---|
| 1 | **Tension pole position adjustment (back tension)**<br><br> 0 mm<br>Cut-out<br>Tension arm assy<br>Tension band assy<br>Supply reel disk<br>Main-deck<br>⑫<br>Tension band holder<br>Fig. 2-5-1<br>Back tention 35±5g-cm | (1) **Required instrument for this adjustment:**<br>•Cassette torque meter (PUJ42881)<br>(2) Disconnect the power cord from AC outlet and cassette tape is ejected, apply black tape or the like to the LED on the center of the deck to shut off infrared rays.<br>(3) Turn on the power and set the mechanism to the Play mode without any cassette tape loaded. Again disconnect the power cord from AC outlet and get the cassette housing to enter the intake state by hand. At that time, no cassette tape is loaded.<br>(4) Loosen the screw ⑫ a little and adjust the tension band holder in the position so that there is no gap (0 mm) between the cutout of the main deck and the tension arm.<br>(5) Tighten the screw ⑫ to fix the tension band holder.<br>(6) Remove the tape applied in the above step (2) and turn on the power.<br>(7) Mount a cassette torque meter and set the mechanism to the REC mode.<br>(8) Confirm that the torque meter reads 30~40g-cm as the supply torque.<br>(9) If the torque meter reads otherwise, clean the supply reel disk in the part that contacts the tension band and check the spring of the tension arm.<br>(10) If the measurement result is still out of the standard, fine adjust the position of the tension band holder just in a range of ±0.5 mm between the tension arm and the cutout of the main deck. Again check the back tension.<br>(11) After completing the above adjustment, apply screw sealant to the tension band holder. |
|  | **— When use the Tentelometer —**<br><br> <br>Back tention 25±4g-cm<br>Fig. 2-5-2 | (1) **Required instruments for this adjustment:**<br>•Tentelometer (PGJ04020) or equivalent<br>(2) Repeat the above steps (2) through (6).<br>(3) Use a tape begin portion of E-180 cassette tape and set to the REC mode.<br>(4) Measure the tension between the impedance roller and the supply guide roller, and make sure of it in the range between 21 and 29 g-cm.<br>(5) Repeat the above steps (9) through (11). |
| 2 | **Take-up torgue check**<br>TU torque 100±55g-cm | (1) **Required instruments for this adjustment:**<br>•Cassette torque meter (PUJ42881)<br>(2) Mount a cassette torque meter and set the mechanism to the REC mode.<br>(3) Confirm that the torque meter reads 45-155 g-cm as the take-up torque. |

## 2.6 INTERCHANGEABILITY ADJUSTMENT

| No. | Item | Adjustment and Check |
|---|---|---|

**Interchangeability must be adjusted after replacement of the upper drum assembly, drum assembly and A/C head assembly, etc.**

1 **Names of main parts**

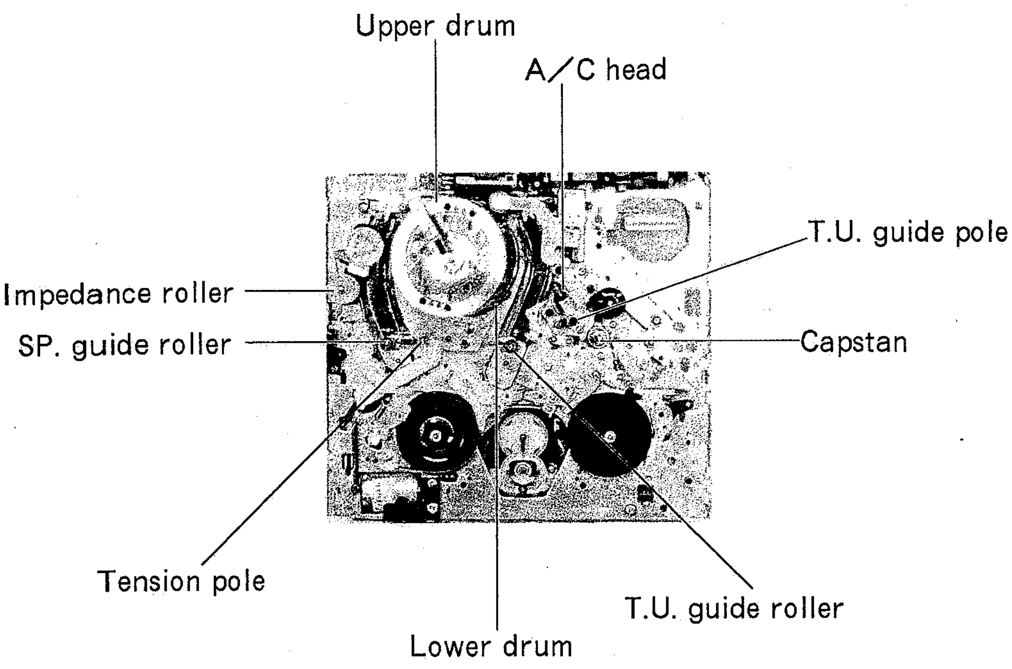

Upper drum
A/C head
T.U. guide pole
Impedance roller
SP. guide roller
Capstan
Tension pole
T.U. guide roller
Lower drum

Fig. 2-6-1

2 **FM waveform check**

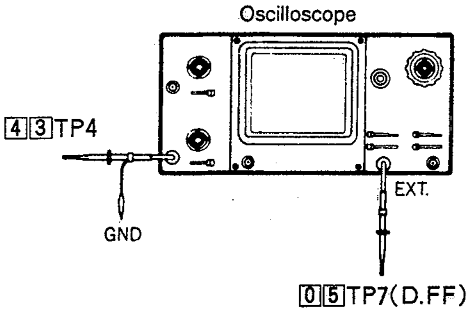
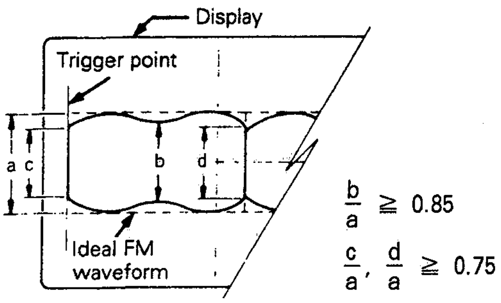

Oscilloscope
43TP4
GND
EXT.
05TP7(D.FF)

Fig. 2-6-2


Display
Trigger point
a
c
b
d
Ideal FM waveform

$\frac{b}{a} \geqq 0.85$

$\frac{c}{a}, \frac{d}{a} \geqq 0.75$

Fig. 2-6-3

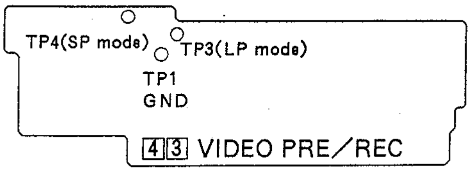
***Note: Before loading any alignment tape, make sure to confirm nothing wrong in tape transport with an ordinary tape.***

(1) For observing FM waveform, connect an oscilloscope with TP4 on 43 VIDEO PRE/REC board while connecting the other probe with TP7 on 05 D/C SERVO board for triggering it externally with ⊖ slope.

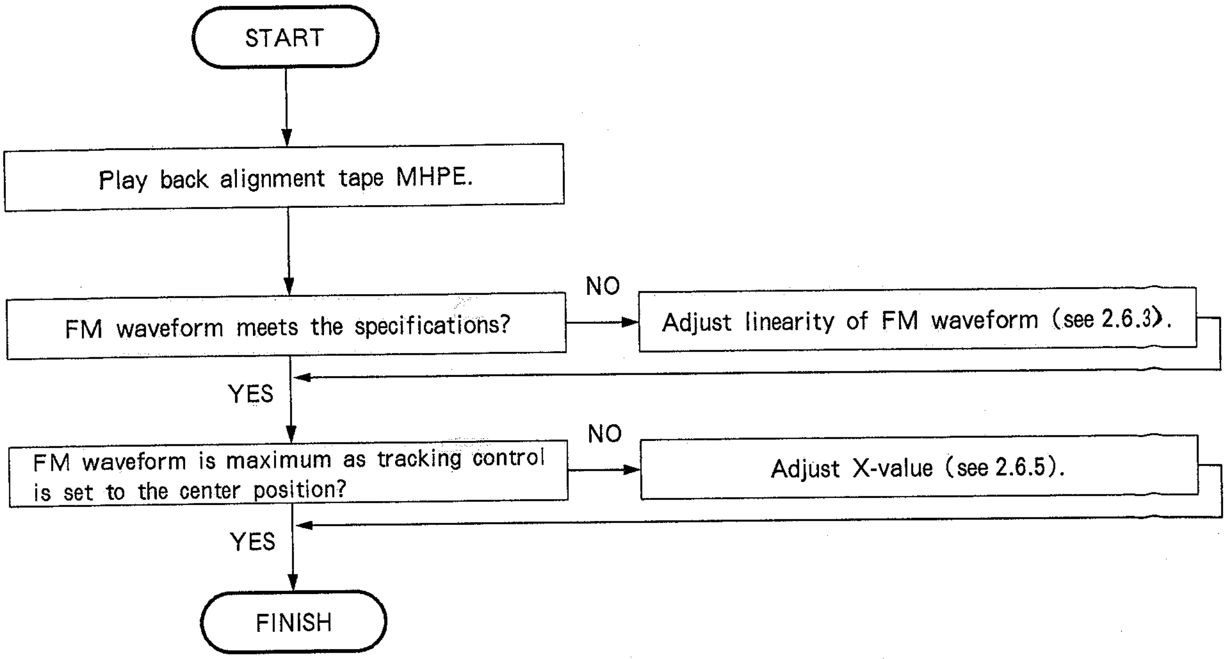
(2) Play back the alignment tape MHPE while turning the tracking control to maximize FM waveform. Referring to Fig. 2-6-3, check whether rate of each level to the maximum level "a" is as specified or not.

(3) When the maximum level "a" is set for 4 scale divisions on the oscilloscope screen, "b" must be more than 3.4 scale divisions while "c" and "d" must be more than 3.0 scale divisions.
***Note: To set the maximum level "a" for 4 scale divisions, adjust the gain control of the oscilloscope in addition to the tracking control that is set to maximum position.***

— Location of TPs —


TP4(SP mode)
TP3(LP mode)
TP1
GND
43 VIDEO PRE/REC

| No. | Item | Adjustment and Check |
|---|---|---|


START
Play back alignment tape MHPE.
FM waveform meets the specifications?
NO
Adjust linearity of FM waveform (see 2.6.3).
YES
FM waveform is maximum as tracking control is set to the center position?
NO
Adjust X-value (see 2.6.5).
YES
FINISH

3 **Interchangeability adjustment**

**— Linearity adjustment —**

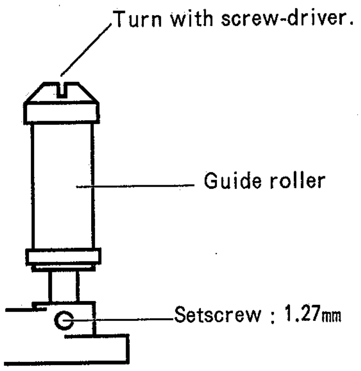
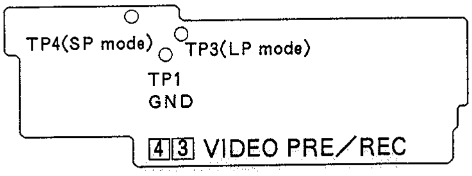
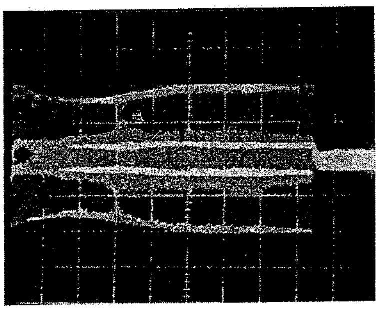

Turn with screw-driver.
Guide roller
Setscrew : 1.27mm

Fig. 2-6-4

— Location of TPs —

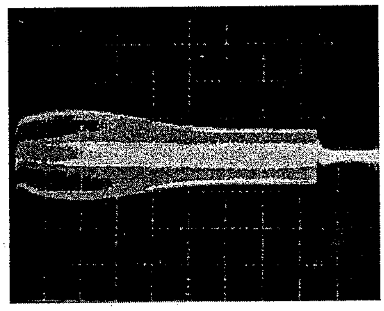

TP4(SP mode)
TP3(LP mode)
TP1
GND
43 VIDEO PRE/REC



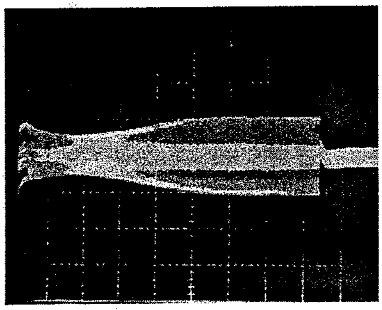
Tracking center

(1) **Precautions for adjustment:**

- For interchangeability adjustment, play back the alignment tape MHPE.
- If FM dropout cannot be corrected by adjusting the guide roller, it needs to replace the drum assembly. This replacement should apply only to the case that waveforms of CH-1 and CH-2 have the same tendency.
- The following pictures show FM waveforms when the lower drum is worn.
- Required tool:
  Hex. key (1.27 mm)

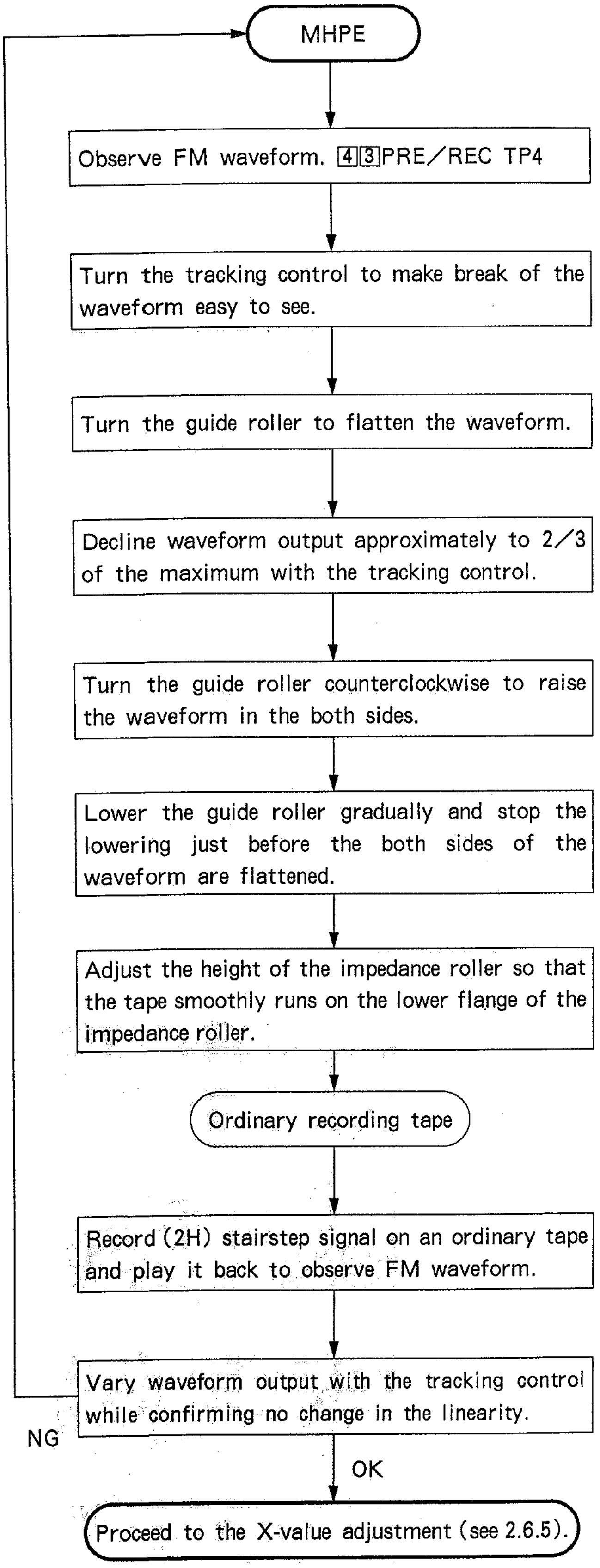


Tracking (−)



Tracking (+)

| No. | Item | Adjustment and Check |
|---|---|---|



MHPE

Observe FM waveform. 43PRE/REC TP4

Turn the tracking control to make break of the waveform easy to see.

Turn the guide roller to flatten the waveform.

Decline waveform output approximately to 2/3 of the maximum with the tracking control.

Turn the guide roller counterclockwise to raise the waveform in the both sides.

Lower the guide roller gradually and stop the lowering just before the both sides of the waveform are flattened.

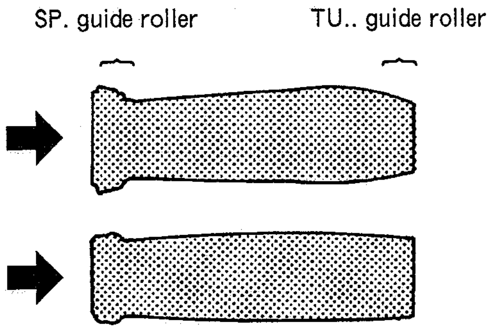
Adjust the height of the impedance roller so that the tape smoothly runs on the lower flange of the impedance roller.

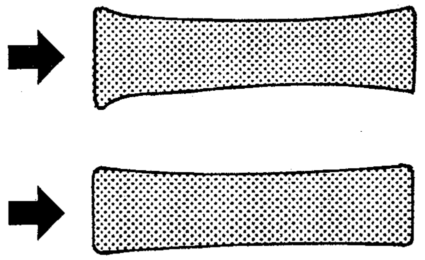
Ordinary recording tape

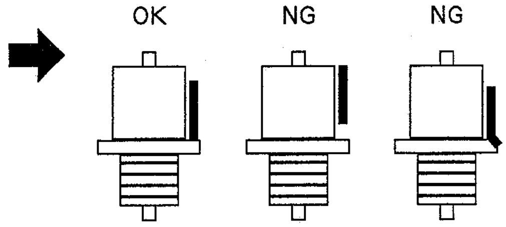
Record (2H) stairstep signal on an ordinary tape and play it back to observe FM waveform.

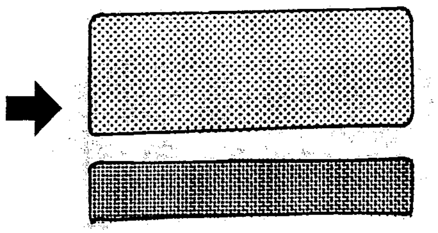
Vary waveform output with the tracking control while confirming no change in the linearity.

Proceed to the X-value adjustment (see 2.6.5).

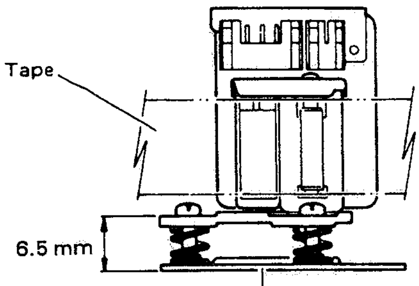






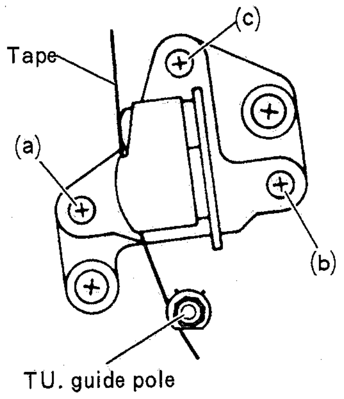


| No. | Item | Adjustment and Check |
|---|---|---|
| 4 | **A/C head adjustment**<br>**If the A/C head is improperly positioned, it results in dropdown of output level or poor S/N ratio in playback audio signal, moreover, misaligned servo without picking-up of control signal at the worst.** | |



Tape
6.5 mm
Head base

Fig. 2-6-5



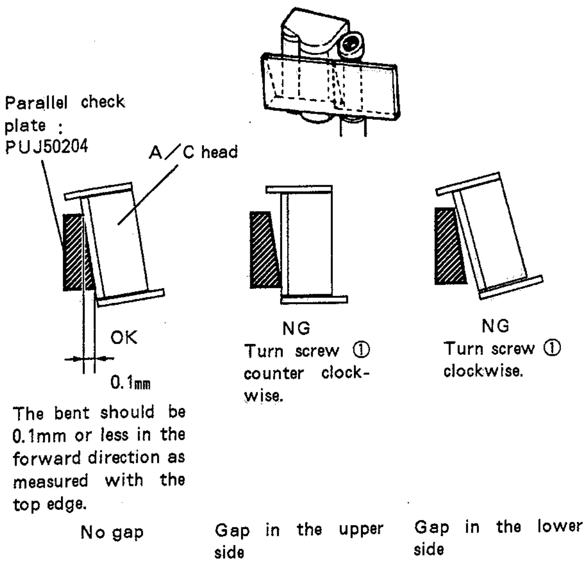
(c)
Tape
(a)
(b)
TU. guide pole

Fig. 2-6-6

- **How to use the parallel check plate**

① Press the right-angle surface of the check plate against the take-up guide pole while make its taper side contact with the A/C head.

② Lightly press the check plate to the A/C head by the upper side and the lower side alternately to check to see if there is a gap between them in the upper or lower side.



Parallel check plate : PUJ50204
A/C head
OK
0.1mm
The bent should be 0.1mm or less in the forward direction as measured with the top edge.
No gap
NG
Turn screw ① counter clock-wise.
Gap in the upper side
NG
Turn screw ① clockwise.
Gap in the lower side

Fig. 2-6-7

(1) **Required implements:**
- Alignment tape : MHPE
- Parallel check plate : PUJ50204(0.1)

(2) **Rough check of A/C head height before adjustment**

① In the stage of tape transport check before height adjustment, temporarily adjust the height of the A/C head in order to prevent alignment tape from damage as well as to perform adjustment with ease.

(3) **Tilt (forward bent) adjustment**

① Adjust the screw (b) with the parallel check plate (PUJ50204) so that tilt of the A/C head is 0.1mm. If there is a gap above the A/C head (this is interpreted as a little tilt), loosen the screw (b) to increase the tilt of the A/C head. (See Fig. 2-6-7.)
On the other hand, if there is a gap underneath the A/C head, tighten the screw (b) to decrease the tilt.

② Confirm that tape is neither damaged nor wrinkled around the lower flange of the take-up guide pole. If tape is wrinkled, fine adjust the height of the take-up guide pole (see 2.7.4).

(4) **Height and azimuth adjustments**

① Connect an oscilloscope with AUDIO OUT (or TP634 of MAIN board).

② Play back the alignment tape MHPE while adjusting the A/C head height with screws (a), (b) and (c) by small and equal increments for maximum audio output. **(Height adjustment)**
***Note: When turning the screws (a), (b) and (c), don't turn them more than quarter round once to prevent the alignment tape from getting damaged.***

③ Play back the alignment tape MHPE while adjusting the screw (c) to minimize for maximum audio output. **(Azimuth adjustment)**

④ Repeat the above steps No.② and No.③ alternately for more precise adjustment.

(5) **A/C head tilt check**

① Confirm that tilt of the A/C head is less than 0.1 mm with the parallel check plate (PUJ50204).

② If it is out of the specifications, repeat the above steps (3) "Tilt (forward bent) adjustment" and (4) "Height and azimuth adjustments".

(6) After completing the above adjustment, apply screw sealant to the screws (a), (b) and (c).

| No. | Item | Adjustment and Check |
|---|---|---|
| 5 | **X-value adjustment** | |

**If X-value is adjusted improperly, it results in time lag between picture and normal sound in playback of a tape that is recorded with a set whose X-value is correctly adjusted.**

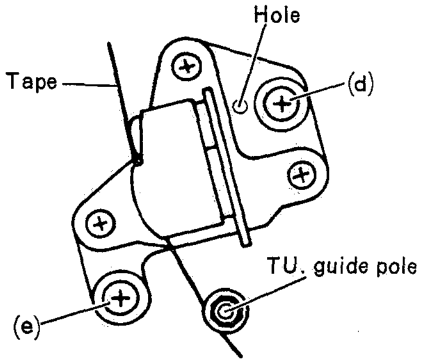


Fig. 2-6-9

Maximize FM output and phase difference in audio and FM no-recorded portions is less than ±1 field.

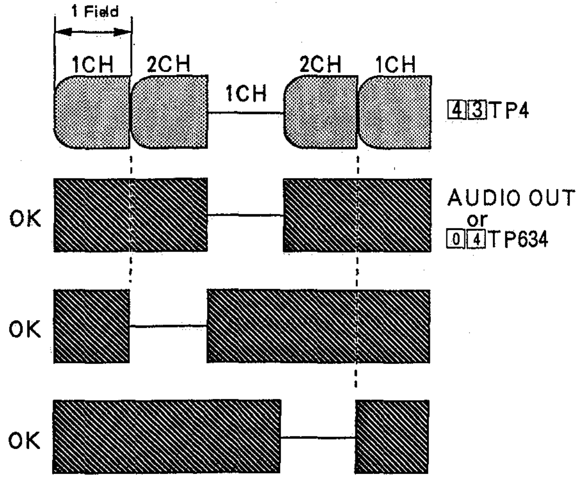


Fig. 2-6-10

- **Manner of external synchronization:**

① Set the oscilloscope's time sweep to 10 msec.

② In the condition that the oscilloscope is synchronized with D. FF signal, turn the oscilloscope's HOLD OFF control in the direction of (+) to stabilize non-recorded portion.

- **Centering of tracking**

① Press both the ⊞ and ⊟ tracking buttons simultaneously.

(1) **Required implements:**
- A/C head positioning driver : PUJ47351-2
- Alignment tapes : MHPE,MBPE-X,MH-2L

(2) **Preparation**

① Connect CH-1 of the oscilloscope with TP4 on [4][3] VIDEO PRE/REC board while connecting CH-2 with AUDIO OUT (or TP634 of MAIN board).

② Trigger the oscilloscope externally with signal from TP7 on [0][5] D/C SERVO board.

③ Set the tracking to center position.

(3) Slightly loosen screws (d) and (e).

(4) Play back the alignment tape MBPE-X.

(5) Set the A/C head positioning driver over screw (d) with the pin of the driver inserted into the indicated hole.

(6) Turn the driver to maximize FM output and to accord phases of audio and FM signals with each other in their no-recorded portions (±1 field).

(7) Remove the driver and tighten screws (d) and (e).

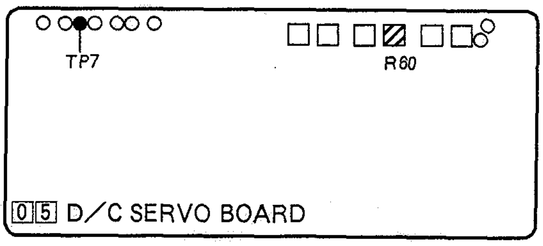
(8) Play back the alignment tape MHPE and confirm that FM waveform is maximum with the tracking control set at the center.

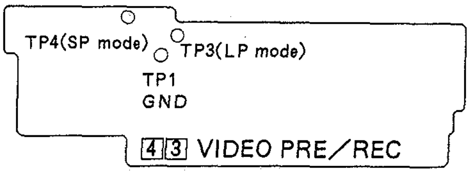
(9) Connect CH-1 of the oscilloscope with TP3 on [4][3] VIDEO PRE/REC board.

(10) Play back stairstep portion of the alignment tape MH-2L while adjusting that FM waveform is maximum with the tracking control set to center position by R60 on [0][5] D/C SERVO board.

(11) After completing the above adjustment, apply screw sealant to the screws (d) and (e).

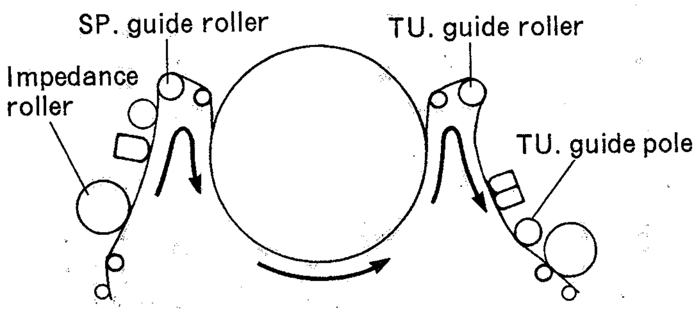
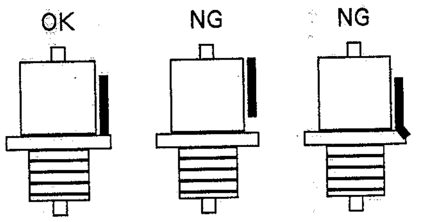
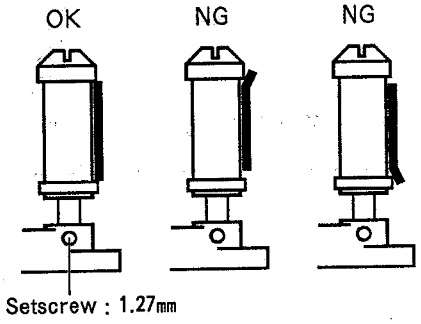
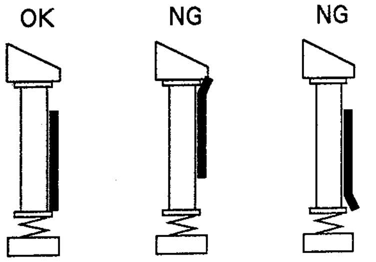
– Location of TPs & VRs –





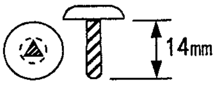
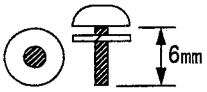
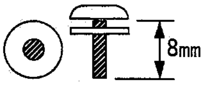
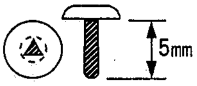
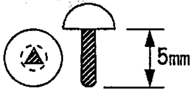
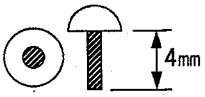
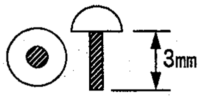
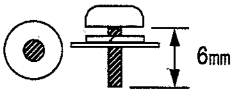
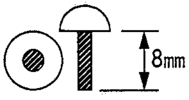
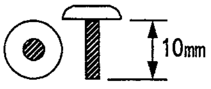
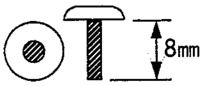
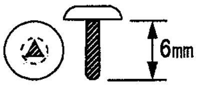
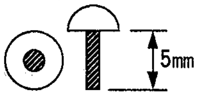
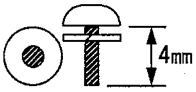
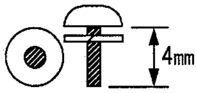
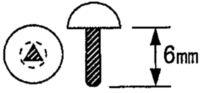
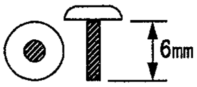
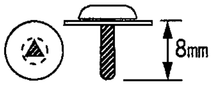
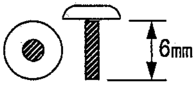
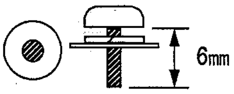
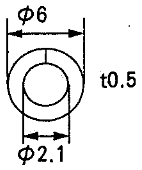
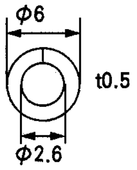
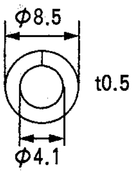
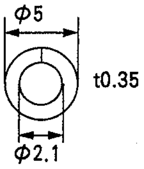
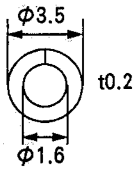
## 2.7 ADJUSTMENT OF TAPE TRANSPORT SYSTEM

***Note:** The tape transport system has been precisely adjusted at the factory before shipment. Check and adjustment are required only after the parts of the tape transport system are replaced.*

| No. | Item | Adjustment and Check |
|---|---|---|
| 1 | **Location of parts**<br><br> SP. guide roller<br>TU. guide roller<br>Impedance roller<br>TU. guide pole<br>Fig. 2-7-1 | |
| 2 | **Impedance roller**<br><br> <br>Fig. 2-7-2 | (1) **Required tool :**<br>•Nut driver (5.5 mm)<br>(2) Play an ordinary thin tape (more than E-240 tape).<br>(3) Adjust the height of the impedance roller so that the tape smoothly runs on the lower flange of the impedance roller. (Lower edge alignment) |
| 3 | **SP. guide rolloer**<br>**TU. guide rolloer**<br><br> <br>Fig. 2-7-3 | (1) **Required tool :**<br>•Hexagon head key (1.27 mm)<br>(2) Slightly loosen the setscrew under the guide roller.<br>(3) Play an ordinary thin tape (more than E-240 tape).<br>(4) Adjust the height of the guide roller temporarily so that the tape smoothly runs.<br>(5) Tighten the setscrew.<br>(6) After the temporary adjustment, check the FM waveform. |
| 4 | **TU. guide pole**<br><br> <br>Fig. 2-7-4 | (1) Play an ordinary thin tape (more than E-240 tape).<br>(2) Adjust the height of the take-up guide pole so that the tape smoothly runs on the lower flange of the take-up guide pole. (Lower edge alignment)<br>(3) Check that the tape is not damaged at and near the take-up guide pole and the guide arm in the following modes several times respectively.<br>PLAY→S.REV→S.FWD→REV PLAY→STILL→PLAY<br>(4) When there is any result unsatisfactory in the above step (3), turn the take-up guide pole within a quarter round to lower the height and repeat the check mentioned in the above step (3).<br>(5) This adjustment result must be checked again after the A/C head adjustment (see 2.6.4) is completed.<br>(6) After the adjustment, apply screw sealant to the screw. |

## 2.8 TABLE OF SCREWS AND SLIT WASHERS USED IN THIS SET

***Note:*** *The numbers of screws and slit washers shown below respectively accord with numbers of them appearing in this section.*

| | | | | |
|---|---|---|---|---|
| ① (gold)<br><br>14mm<br>PQ43831-2 (M4) | ② (gold)<br><br>6mm<br>LPSP2606Z | ③ (gold)<br><br>8mm<br>PDM4165A (M3) | ④ (gold)<br><br>5mm<br>SDST2605Z | ⑤ (gold)<br><br>5mm<br>SPST2605Z |
| ⑥ (gold)<br><br>4mm<br>SPSP2604Z | ⑦ (gold)<br><br>3mm<br>SPSP2603Z | ⑧ (gold)<br><br>6mm<br>PRD30027-04 (M2.6) | ⑨ (black)<br><br>8mm<br>PQ43687A (M2.6) | ⑩ (gold)<br><br>10mm<br>SDSP2610Z |
| ⑪ (gold)<br><br>8mm<br>SDSP2608Z | ⑫ (gold)<br><br>6mm<br>SDST2606Z | ⑬ (silver)<br><br>5mm<br>SPSP2605N | ⑭ (gold)<br><br>4mm<br>LPSP2004Z | ⑮ (gold)<br><br>4mm<br>LPSP2604Z |
| ⑯ (gold)<br><br>6mm<br>SPST2606Z | ⑰ (gold)<br><br>6mm<br>SDSP2606Z | ⑱ (gold)<br><br>8mm<br>PQ44003 (M2.6) | ⑲ (black)<br><br>6mm<br>PRD43165 (M2) | ⑳ (gold)<br><br>6mm<br>DPSP2606Z |
| Ⓐ<br><br>Φ6<br>t0.5<br>Φ2.1<br>PQM30017-5 (white) | Ⓑ<br><br>Φ6<br>t0.5<br>Φ2.6<br>PQM30017-6 (white) | Ⓒ<br><br>Φ8.5<br>t0.5<br>Φ4.1<br>PQM30017-28(white) | Ⓓ<br><br>Φ5<br>t0.35<br>Φ2.1<br>PQM30017-22 (red) | Ⓔ<br><br>Φ3.5<br>t0.25<br>Φ1.6<br>PQM30017-25 (red) |

# SECTION 3
# ELECTRICAL ADJUSTMENT

## 3.1 PREPARATION

### 3.1.1 Precautions

- Before proceeding to any electrical adjustment, it is the first prerequisite to confirm that the objective item is out of order or of breakdown.
  Moreover, for parts and items that need correct mechanical adjustment prior to electrical adjustment, begin by confirming that they are exactly mechanically adjusted.
- Make sure to start electrical adjustment 5 or more minutes after the power is turned on.
- Unless otherwise indicated, use the 10 : 1 probe.

### 3.1.2 Required tools and test instruments

- Frequency counter (10MHz or more and 100mV or less in the sensitivity)
- Video signal generator (TG-7/2, Model 1411 or equivalent)
- Sweep signal generator (100kHz to 10MHz, or equivalent)
- Oscilloscope
- TV monitor
- Vectorscope (521A or equivalent)
- Audio tester
- Jitter display (Meguro MK6110A or equivalent)
- Digital voltmeter (readable up to 1 $mV_{DC}$)

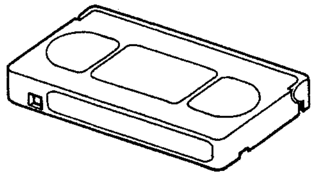
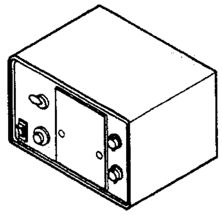
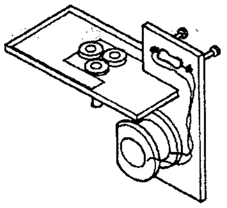
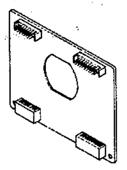
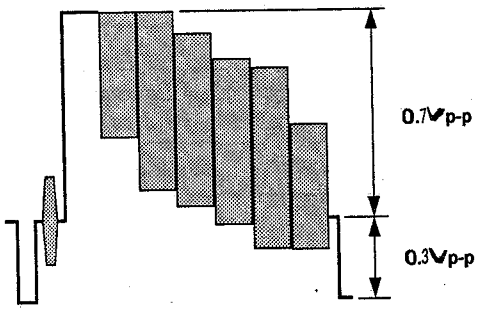
| | |
|---|---|
| Alignment tapes<br>MHPE,MH-2L,<br>MHVE-2,MBVE-3 | Carrier checker<br>PGJ05008-2 |
|  |  |
| Head resonance adjusting coil<br>PTU94004A | Extension board<br>PGJ05037 |
|  | Not used for adjustment<br> |

Fig. 3-1-1 Required special implements

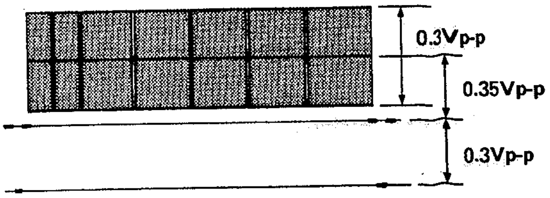
### 3.1.3 Signals required for video system adjustment

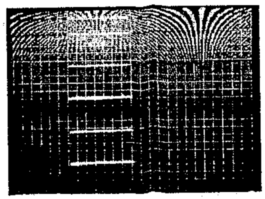
1. EBU color bar signal (75%)



To be used for Y/C level adjustment.
All color levels appearing in this chapter are measured or to be measured with this color bar signal. Make sure not to use other color bar signals such as of 100% in the color level, since it leads to different and wrong measurement results.

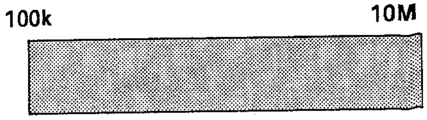
2. Video sweep signal (100kHz to 5MHz)





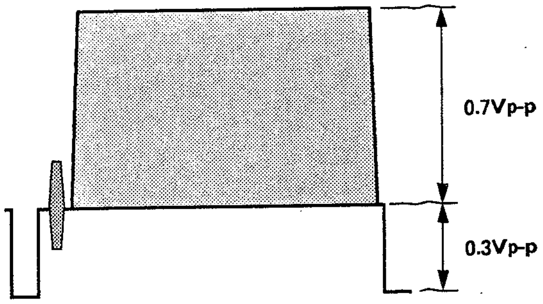
To supply this signal through the LINE IN terminal, make sure to use a sweep signal having a good characteristic in the H correlation in order to avoid erroneous operation of comb filters.
For a reference, a signal having a good H correlation shows such a clear pattern as neighboring black and white lines are the same in the width and the interval on the monitor as shown in the figure above.

3. Sweep signal



To be used head resonance adjustment.
MAKER : 5.0MHz

4. 100% chroma



### 3.1.4 Specification of alignment tapes

**·MHPE**

| Video signal | Audio signal | Application | Remark |
|---|---|---|---|
| VHS SP mode<br>Stairstep | 6kHz | ·Check and adjustment of interchangeability.<br>·For adjustment of PB switching point. | MH-2 stairstep signal substitutable. |

**·MH-2L**

| No. | PB time | Video signal | Audio signal | Application |
|---|---|---|---|---|
| 1 | 5 minutes | VHS LP mode stairstep (Only CH-1 recording) | – | For check and adjustment of tracking pre-set and PB SW point. |
| 2 | 5 minutes | VHS LP mode color bar | – | For check and adjustment of video PB circuit. |

**·MHVE-2**

| Video signal | Audio signal | Application | Remark |
|---|---|---|---|
| VHS SP mode<br>Color bar | – | For check and adjustment of video PB circuit. | MH-2 color bar signal is substitutable. |

**·MBVE-3**

| Video signal | Audio signal | Application | Remark |
|---|---|---|---|
| B/W sweep | – | For check and adjustment of video PB circuit. | Only MHVE-3 part name changed. |

### 3.1.5 Switches setting

(1) Unless otherwise indicated, perform all adjustments with the switches and controls set as follows.

- **Switches on Front panel**

TIME LAPSE MODE :3H (SP)
ON SCREEN :OFF
AUTO REC :OFF
VISS :OFF
ALARM REC :OFF
COUNTER MEMORY :OFF
REPEAT REC/PLAY :OFF
VHS VIDEO MODE :AUTO
REMOTE :LOCAL

- **On-Screen Menu SW**

ALARM MODE :SP
ALARM TIME :MANUAL
CAM SW :OFF
SERIES REC :ON

- **Switches on Rear panel**

DIP SW 2 :OFF
DIP SW 1, 3–8 :ON
V. PULSE :OFF

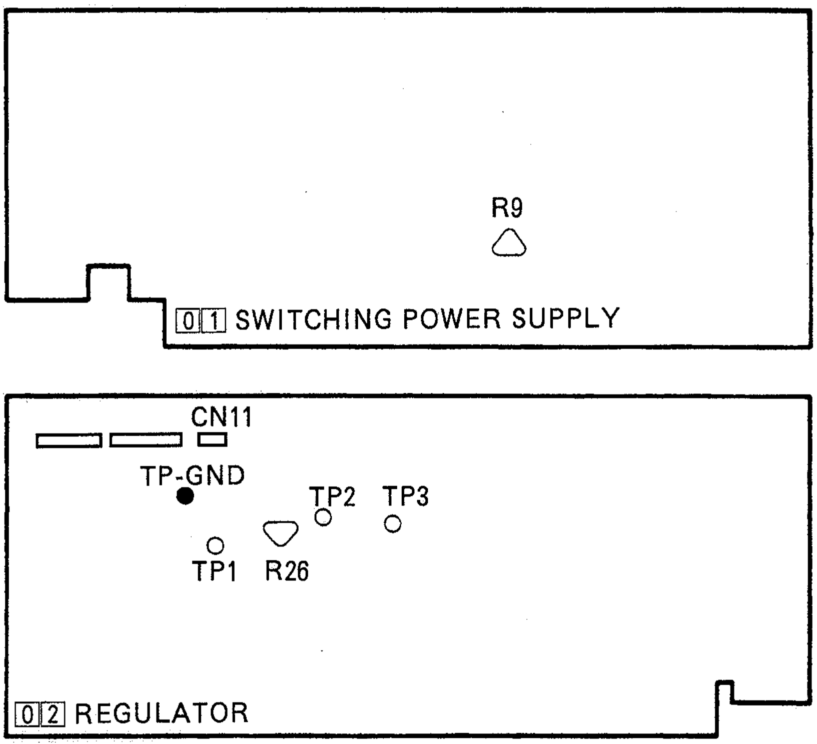
(2) When the above setting is changed for adjustment, reset it to the original position as mentioned above.
(3) Proceed to any adjustment 5 minutes or more after the power is turned on.
(4) Unless otherwise specified, use VHS E-180 cassette tape.

## 3.2 REGULATOR CIRCUIT

***Note: Unless otherwise specified, all check points and adjustment parts are located on 02 REGULATOR board.***

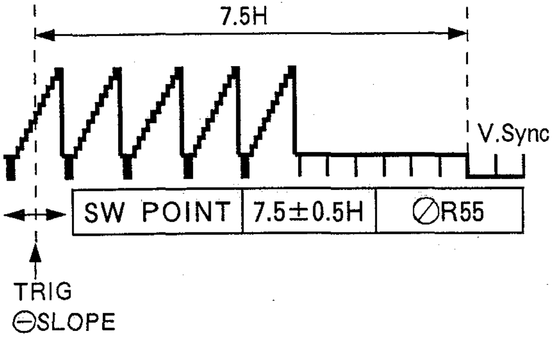
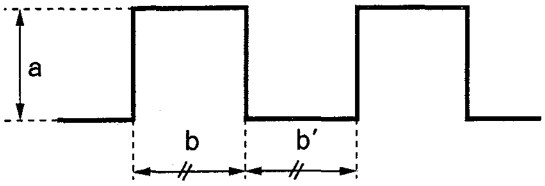
| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 1 | **SWD 5V output voltage** | TP1<br>↓<br>digital voltmeter | R26 | – | EE | (1) Connect a digital voltmeter to between TP1 and TP-GND.<br>(2) Adjust R26 for 5.345±0.1V. |
| | | | TP1 | $5.345\pm0.1V_{DC}$ | ⊘R26 | |
| 2 | **SEMI-REG. 15V output voltage** | CN11-pin①<br>↓<br>digital voltmeter | R9 01 | – | EE | (1) Connect a digital voltmeter to between pin① of CN11 and TP-GND.<br>(2) Adjust R9 to obtain 15.8±0.2V. |
| | | | CN11-① | $15.8\pm0.2V_{DC}$ | ⊘R9 | |

### ■Location of TP & VR

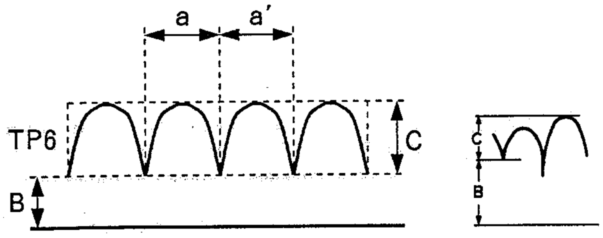

R9
01 SWITCHING POWER SUPPLY
CN11
TP-GND
TP2
TP3
TP1
R26
02 REGULATOR

## 3.3 SERVO CIRCUIT

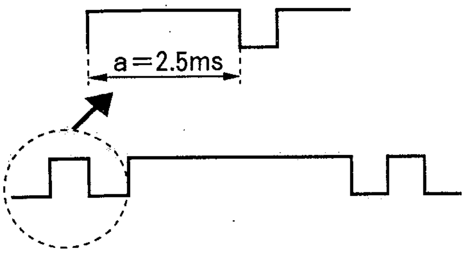
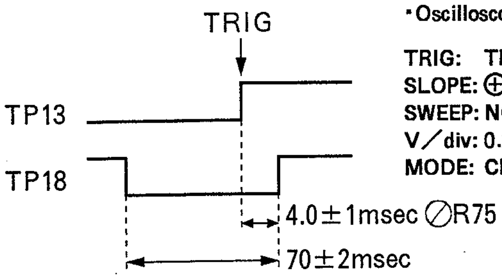
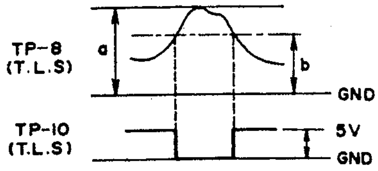
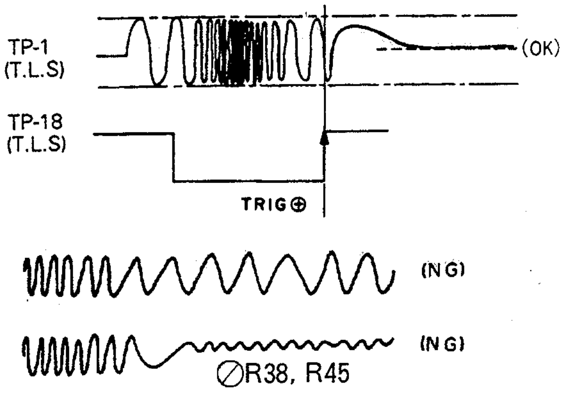
***Note: Unless otherwise specified, all check points and adjustment parts are located on 06 TL SERVO board.***

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 1 | **PB switching point** | TP31 03<br>VIDEO OUT<br>TRIG. TP32<br>03 | R55 05 | MHPE | PB | (1) Connect an oscilloscope's CH-1 probe to TP31 on the 03 MAIN board.<br>(2) Connect the other probe of the oscilloscope to TP32(D.FF) on the 03 MAIN board for triggering it externally.<br>(3) Set the oscilloscope for the minus ⊖ slope.<br>(4) Press the tracking buttons to maximize the FM waveform.<br>(5) Connect an oscilloscope's CH-1 probe to the VIDEO OUT.<br>(6) Play back the MHPE alignment tape while adjusting R55 so that the switching point is 7.5±0.5H before the V.sync. |
|  |  |  7.5H<br>V.Sync<br>SW POINT<br>7.5±0.5H<br>⊘R55<br>TRIG<br>⊖SLOPE |  | MH-2L | PB | (7) Play back the stairstep segment of the alignment tape MH-2L.<br>(8) Set the oscilloscope for the plus ⊕ slope.<br>(9) Confirm that the switching point is 6.5H±1.5H before the V.sync. |
| 2 | **Speed data F-V** | TP15<br>↓<br>Digital voltmeter | R176 | Color bar | LP<br>REC | (1) Connect a digital voltmeter to TP15.<br>(2) Set the VCR to the 6H REC mode (LP).<br>(3) Adjust R176 so that the digital voltmeter reads 2.1 ±0.1V$_{DC}$. |
|  |  | TP15 \| 2.1±0.1V$_{DC}$ \| ⊘R176 | R179 |  | SP<br>REC | (4) Set the VCR to the 3H REC mode (SP).<br>(5) Adjust R179 so that the digital voltmeter reads 2.1 ±0.1V$_{DC}$. |
|  |  | TP15 \| 2.1±0.1V$_{DC}$ \| ⊘R179 |  |  |  |  |
| 3 | **Capstan FG duty** | TP3<br>TP4 | R10<br>R4 | Color bar | SP<br>REC | (1) Connect the oscilloscope to TP3.<br>(2) Adjust R10 to obtain the following results referring to the left figure.<br>a=5±0.5V<br>b=b' (Duty : 50±5%)<br>(3) Connect the oscilloscope to TP4 and perform the same adjustment as the step (2) by R4.<br>***Note:*** ***When measured value is inconstant, adopt an average valu of the fluctuation.*** |
|  |  |  <br>a=5±0.5V<br>Duty 50±5% |  |  |  |  |

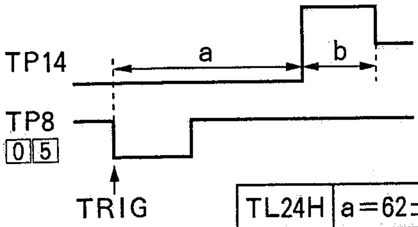
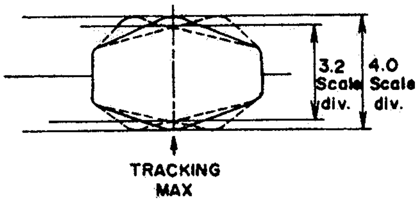
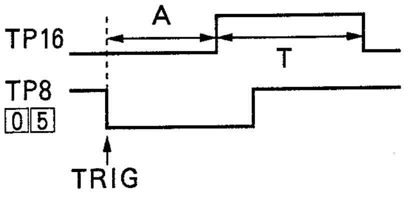
***Note: Unless otherwise specified, all check points and adjustment parts are located on 06 TL SERVO board.***

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 4 | **Stop servo level** | TP6<br>TP-GND | R43 | – | REC | (1) Connect the oscilloscope to TP6, and set the VCR to the REC mode with E-180 cassette tape.<br>(2) Adjust R43 so that a=a' (50±5%) in the waveform at TP6. |
| | | TP6 | a=a' | ⊘R43 | | |
| | | | R45<br>R38 | – | REC | (3) Alternately adjust R45 and R38 so that the waveform at TP6 satisfies the following specifications.<br>B=3.0±0.2V<br>C=6.0±0.5Vp-p.<br>***Note:*** *• When the waveform has stepping difference in the level, adjust according to the higher level.*<br>*• When there is fluctuation in the waveform, adjust according to the center level.*<br>*• Fine adjustment of R38 and R45 will be required for the later item No.8.* |
| | |  | | | | |
| | | TP6 | $B=3.0\pm0.2V_{DC}$ | ⊘R45 | | |
| | | TP6 | $C=6.0\pm0.5Vp\text{-}p$ | ⊘R38 | | |
| | | TP7<br>TP-GND | – | Color bar | STOP | (4) Connect the oscilloscope to TP7 and confirm no level fluctuation in the waveform (with constant voltage). |
| 5 | **Slow F-V converter** | TP8<br>TP-GND<br>↓<br>Digital voltmeter | R56 | MHPE | PB | (1) Adjust R56 for $3.9\pm0.05V_{DC}$. |
| | | TP8 | $3.9\pm0.05V_{DC}$ | ⊘R56 | | |
| 6 | **F-V converter center voltage** | TP12<br>TP-GND<br>↓<br>Digital voltmeter | R62 | MHPE | PB | (1) Adjust R62 for $2.5\pm0.1V_{DC}$. |
| | | TP12 | $2.5\pm0.1V_{DC}$ | ⊘R62 | | |

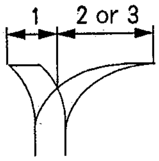
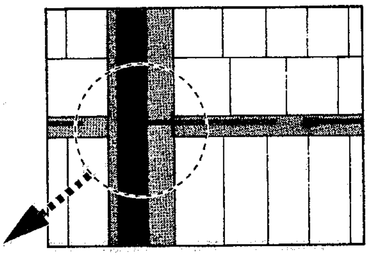
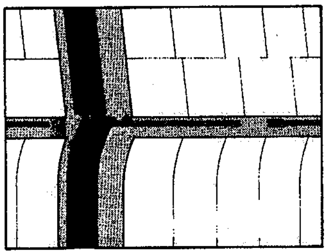
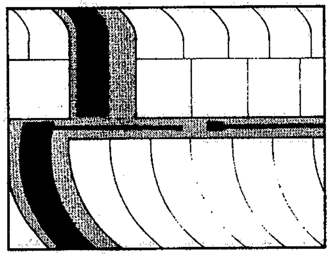
***Note: Unless otherwise specified, all check points and adjustment parts are located on 0 6 TL SERVO board.***

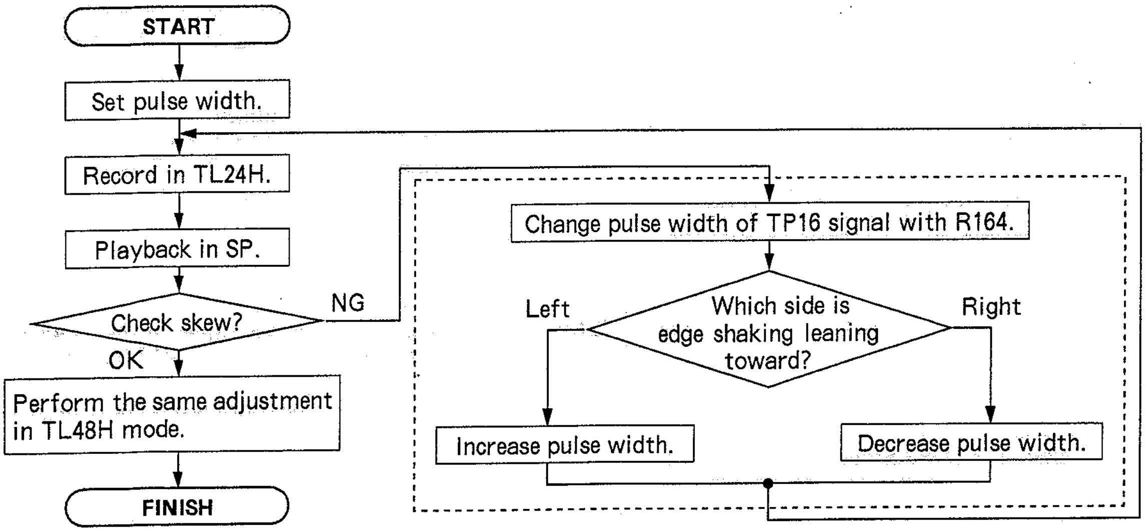
| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 7 | **F-V limiter** | TP11<br>TP5 | R87<br>R97 | Color bar | TL24H<br>REC | (1) Connect the CH-1 probe of the oscilloscope to TP11.<br>(2) Set the REC mode switch to TL24H mode.<br>(3) Adjust R87 so that the width "a" in the waveform of TP11 is 2.5msec.<br>(4) Adjust R97 so that the width "a" in the waveform at TP5 is 2.5msec.<br>**•Oscilloscope setting**<br>**SLOPE: ⊕**<br>**SWEEP: NORM, 0.5msec**<br>**V/div: 0.2V/div** |
| |  | | | | | |
| 8 | **TL tape advance** | TP13<br>TP18 | R75 | Color bar | TL24H<br>REC | ***Note:*** ***This item is to adjust the amount of tape forwarding in the TIMELAPSE REC mode to match it for 1 field. If this is incorrectly adjusted, it causes unstable servo in the SP playback mode.***<br>(1) Change the setting of the REC mode switch to TL24H.<br>(2) Connect the oscilloscope to TP13 and TP18.<br>(3) Adjust R75 so that the rise edge of TP18's waveform is 4±1msec behind the rise edge of TP13's waveform.<br>(4) Confirm pulse width of TP18 is 70±2msec, if not, repeat the above step (3). |
| |  | | | **•Oscilloscope setting**<br>**TRIG: TP13**<br>**SLOPE: ⊕**<br>**SWEEP: NORM, 1msec**<br>**V/div: 0.2V/div**<br>**MODE: CHOP** | | |
| | | TP8<br>TP10 | | | | (5) Connect the oscilloscope to TP8 and TP10.<br>(6) Referring to the left figure, confirm that the portion "a" of the waveform is $3.2\pm0.3V_{DC}$ while "b" is 1.4 ±0.15V.<br>TP8 \| $a=3.2\pm0.3V_{DC}$<br>TP8 \| $b=1.4\pm0.15Vp\text{-}p$ |
| |  | | | **•Oscilloscope setting**<br>**TRIG: TP10**<br>**SLOPE: ⊖**<br>**SWEEP: NORM, 5msec**<br>**V/div: 0.2V/div (TP10)**<br>**0.1V/div (TP8)**<br>**MODE: CHOP** | | |
| | | TP1<br>TP18 | R38<br>R45 | | | (7) Connect the oscilloscope to TP18 and TP1.<br>(8) Confirm that TP1's waveform shows the lowest level at the rise edge of TP18's waveform.<br>(9) Confirm that TP1's waveform is stable after the rise of TP18's waveform. If it is unstable, stabilize the waveform by adjusting R38 and R45.<br>(10) Confirm the STOP SERVO level adjustment for the item No.4.<br>**•Oscilloscope setting**<br>**TRIG: TP18**<br>**SLOPE: ⊕**<br>**SWEEP: NORM, 10msec**<br>**V/div: 0.2V/div**<br>**MODE: CHOP** |
| |  TP-1 (T.L.S)<br>(OK)<br>TP-18 (T.L.S)<br>TRIG⊕<br>(NG)<br>(NG)<br>∅R38, R45 | | | | | |

*Note: Unless otherwise specified, all check points and adjustment parts are located on 06 TL SERVO board.*

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 9 | **TL REC CTL position** | TP14<br>TP8 05 | R166 | Color bar | TL 24H REC | (1) Set the REC MODE switch to TL24H mode.<br>(2) Connect the oscilloscope to TP14 and TP8 on 05 D/C SERVO board, then trigger the oscilloscope internally for minus ⊖ slope with signal from TP8.<br>(3) Adjust R166 so that a=62±0.5msec while confirm to obtain 12±0.5msec for "b". |
| |  <br>**• Oscilloscope setting**<br>**TRIG: TP8**<br>**SLOPE: ⊖**<br>**SWEEP: NORM, 10msec**<br>**V/div: 0.2V/div**<br>**MODE: CHOP**<br>TL24H \| a=62±0.5msec \| ∅R166 | | | | | |
| | | TP4 43<br>TP7 05 | | Color bar | TL24H REC<br>↓<br>SP PB | (4) Connect the oscilloscope to TP4 on the 43 PRE/REC board.<br>(5) Trigger the oscilloscope externally with TP7 on the 05 D/C SERVO board.<br>(6) Playback the portion recorded in the TL24H REC mode.<br>(7) Press the tracking button to maximize the FM level with care not to taper the waveform.<br>(8) Set the FM level to be for 4.0 scale divisions.<br>(9) Set the tracking control to the preset position by simultaneously pressing the ⊞ and ⊟ tracking buttons.<br>(10) Confirm that the FM level is more than 3.2 scale divisions.<br>(11) If not, vary the value of "a" in the step (3) while repeating the steps (4) through (10) to obtain satisfactory results. |
| |  <br>**• Oscilloscope setting**<br>**TRIG: TP7**<br>**SLOPE: ⊖**<br>**SWEEP: AUTO, 2msec**<br>**V/div: 10mV/div** | | | | | |
| 10 | **TL skew** | TP16<br>TP8 05 | R164 | Color bar | TL24H REC | ***Note: Record it on the beginnig portion of recording tape.***<br>(1) Connect a TV monitor to the VIDEO OUT (when a jitter meter is available, connect it between the two).<br>(2) Connect the oscilloscope to TP16 with external trigger from TP8 on the 05 D/C SERVO board (minus ⊖ slope).<br>(3) Adjust R164 as follows.<br>R164 to obtain 14±0.5msec for T.<br>Confirm to obtain 5.7±0.5msec for A. |
| | **• Oscilloscope setting**<br>**TRIG: TP8**<br>**SLOPE: ⊖**<br>**SWEEP: NORM, 1msec or 2 msec**<br>**V/div: 0.2V/div**<br>**MODE: CHOP**<br> <br>TL24H \| T=14±0.5msec \| ∅R164 | | | | | |
| | | | R163 | Color bar | TL48H REC | (4) Record the color bar signal in the TL48H REC mode, and adjust R163 so that T=14.0±0.5msec.<br>(To be continued on next page.) |
| | TL48H \| T=14±0.5msec \| ∅R163 | | | | | |

***Note: Unless otherwise specified, all check points and adjustment parts are located on 06 TL SERVO board.***

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 10 | **TL skew**<br><br> <br>The best condition is that the ratio of leftward shaking to rightward shaking in "1" to "2 to 3". | VIDEO OUT<br>↓<br>TV monitor<br>Color bars on TV monitor<br><br>E-E mode<br><br>When shaking is one-sided to the right : Decrease the pulse width of TP16 signal.<br><br>When shaking is one-sided to the left : Increase the pulse width of TP16 signal. | – | Color bar | TL24H REC<br>↓<br>SP PB | (5) Record the color bar signal in the TL24H REC mode, and play it back in the SP mode.<br>(6) Set the TV monitor's switches as follows :<br>AFC switch : NORMAL or FAST<br>H DL switch : ON<br>V DL switch : ON<br>In the above condition, confirm that edge portion trembles rightwards as a whole and to that in the right side is 1 : 2 to 1 : 3. When tremble deflects in a side, adjust it to do for 4.5 μsec (for half a color bar) or less in the right side.<br>**Note:** ***Since this tremble is different by VCR, adjust it to minimum ratio and value.***<br>(7) In the above result is out of the specifications, repeat the step (3).<br>Increasing "T" deflects rightwards.<br>Decreasing "T" deflects leftwards.<br>(8) When a jitter meter is used, set the width of the marker to 0.15 μsec and confirm that fluctuation of the waveform is within 0.15 μsec. If not, inspect the tape transport system. |
| | | | | | TL48H REC<br>↓<br>SP PB | (9) Record the color bar signal in the TL48H mode and play it back in the SP mode.<br>(10) Confirm the results of the above steps (6) through (8).<br>If there is something incorrect, adjust R163.<br>**Note:** ***•Don't disturb the above-mentioned VRs unless there is extreme skew observed in the picture.***<br>***•Skew is different depending on AFC of TV monitor.***<br>***•To connect a jitter meter, set is as follows.***<br>***FUNCTION :CCIR***<br>***FILTER :NORM***<br>***MONITOR :V***<br>***MULTIPLIER :×30***<br>***V-AREA :0.5V***<br>***•Use it on the beginning portion of recording tape.*** |


START
Set pulse width.
Record in TL24H.
Playback in SP.
Check skew?
NG
OK
Perform the same adjustment in TL48H mode.
FINISH
Change pulse width of TP16 signal with R164.
Left
Which side is edge shaking leaning toward?
Right
Increase pulse width.
Decrease pulse width.

## 3.4 TIMELAPSE SLOW PLAYBACK CIRCUIT

***Note: Unless otherwise specified, all check points and adjustment parts are located on 05 D/C SERVO board.***

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 1 | **SP TIMELAPSE PB tracking preset** | VIDEO OUT<br>↓<br>TV monitor | R16 | Color bar | SP<br>REC<br>↓<br>TL24H<br>PB | (1) Set the tracking control to the preset position by simultaneously pressing the ⊞ and ⊟ tracking buttons.<br>(2) Record the color bar signal in the SP mode and play it back in the TL24H mode.<br>(3) Observing a TV monitor, adjust R16 to minimize noise bar in the picture. |
| | ***Note:** For recording, do not use the beginning and end portions of tape.* | | | | | |
| 2 | **SP ×2 tracking preset** | VIDEO OUT<br>↓<br>TV monitor | R61 | Color bar | SP<br>REC<br>↓<br>×2PLAY | (1) Set the tracking control to the preset position by simultaneously pressing the ⊞ and ⊟ tracking buttons.<br>(2) Record the color bar signal in the SP mode and play it back in the ×2 PLAY mode.<br>(3) Observing a TV monitor, adjust R61 to minimize noise bar in the picture. |
| | ***Note:** For recording, do not use the beginning and end portions of tape.* | | | | | |
| 3 | **LP TIMELAPSE PB tracking preset** | VIDEO OUT<br>↓<br>TV monitor | R18 | Color bar | LP<br>REC<br>↓<br>TL24H<br>PB | (1) Set the tracking control to the preset position by simultaneously pressing the ⊞ and ⊟ tracking buttons.<br>(2) Record the color bar signal in the LP mode and play it back in the TL24H mode.<br>(3) Observing a TV monitor, adjust R18 to minimize noise bar in the picture. |
| | ***Note:** For recording, do not use the beginning and end portions of tape.* | | | | | |
| 4 | **LP ×2 tracking preset** | VIDEO OUT<br>↓<br>TV monitor | R59 | Color bar | LP<br>REC<br>↓<br>×2PLAY | (1) Set the tracking control to the preset position by simultaneously pressing the ⊞ and ⊟ tracking buttons.<br>(2) Record the color bar signal in the LP mode and play it back in the ×2 PLAY mode.<br>(3) Observing a TV monitor, adjust R59 to minimize noise bar in the picture. |
| | ***Note:** For recording, do not use the beginning and end portions of tape.* | | | | | |
| 5 | **V. pulse position** | VIDEO OUT<br>↓<br>TV monitor | V. LOCK VR<br>(Front) | Color bar | SP<br>REC<br>↓<br>STILL | (1) Set the tracking control to the preset position by simultaneously pressing the ⊞ and ⊟ tracking buttons.<br>(2) Record the color bar signal in the SP mode and play it back in the STILL mode.<br>(3) Adjust the V.LOCK VR on the front panel to minimize the V. dancing on the monitor screen. |
| | | | | | LP<br>REC<br>↓<br>STILL | (1) Set the tracking control to the preset position by simultaneously pressing the ⊞ and ⊟ tracking buttons.<br>(2) Record the color bar signal in the LP mode and play it back in the STILL mode.<br>(3) Adjust the V.LOCK VR on the front panel to minimize the V. dancing on the monitor screen. |

## 3.5 AUDIO CIRCUIT

***Note: Unless otherwise specified, all check points and adjustment parts are located on 04 MAIN board.***

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 1 | **Audio bias level** | TP631<br>TP632<br>(GND)<br>↓<br>AC millivoltmeter | R641 | No signal | SP<br>REC | (1) Connect the AC millivoltmeter to TP631 and TP632 (GND).<br>(2) Adjust R641 so that the level is 2.4±0.2mVrms in recording without input signal. |
|  |  | TP631 | 2.4±0.2mVrms | ⌀R641 |  |  |
| 2 | **Audio PB level** | AUDIO OUT<br>↓<br>AC millivoltmeter | R633 | 1kHz/<br>−8sBs<br>↓<br>AUDIO IN | SP<br>REC<br>↓<br>PB | (1) Supply sine waveform signal of 1kHz/−8dBs to AUDIO IN terminal.<br>(2) Record and play it back, adjust R633 to obtain −6±1.0dBs as the AUDIO OUT level. |
|  |  | AUDIO OUT | −6±1.0dBs | ⌀R633 |  |  |

## 3.6 PRE／REC CIRCUIT

*Note:* ･*Unless otherwise noted, all test points and adjustments are located on the* 43 *PRE／REC board.*
･*This adjustment is required only after replacing the upper drum assembly.*
･*Connect ground of probe (oscilloscope) to TP-GND1 of the PRE／REC board.*

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 1 | **Video head resonance & Q** | TP4(SP)<br>TP3(LP)<br>TRIG. VD of signal generator | ･SP CH-1<br>R18<br>･LP CH-2<br>R12 | RF sweep | EE<br>SP CH-1<br>LP CH-2 | (1) Confirm the TP7(D.FF) of the 05 D／C SERVO board is low level. If not, rotate the upper drum counterclockwise approx. 25 rps rotation speed manually. Again confirm the TP7 is low level.<br>(2) Set the adjustment jig to the SP CH-1／LP CH-2 head side as shown in Fig. 3-6-3.<br>(3) Connect an oscilloscope to TP4(TP3).<br>(4) Supply a sweeper generator output to adjustment jig as shown in Fig. 3-6-2, then adjust the sweeper generator output for approx. 100mVp-p.<br>(5) Trigger the oscilloscope externally with the signal from trigger output(VD) of the sweeper generator.<br>(6) Adjust the GAIN control of the oscilloscope to set the 1MHz portion for 2.0 scale divisions.<br>(7) Adjust R18(R12) to position the 5.5MHz portion (it is not resonance portion) at 4.0 scale divisions as shown in Fig.3-6-1.<br>(8) Remove the adjustment jig. |
|  |  |  | ･SP CH-2<br>R15<br>･LP CH-1<br>R13 |  | EE<br>SP CH-2<br>LP CH-1 | (1) Confirm the TP7 of the 05 D／C SERVO board is high level. If not, rotate the upper drum counterclockwise approx. 25 rps rotation speed manually. Again confirm the TP7 is high level.<br>(2) Set the adjustment jig to the SP CH-2／LP CH-1 head side as shown in Fig. 3-6-3.<br>(3) In the same manner as above steps (3) to (8) for SP CH-2(LP CH-1) head. |

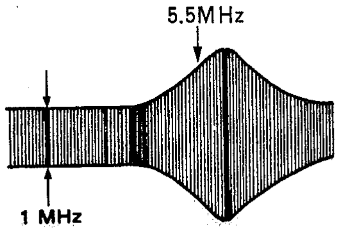


Fig. 3-6-1

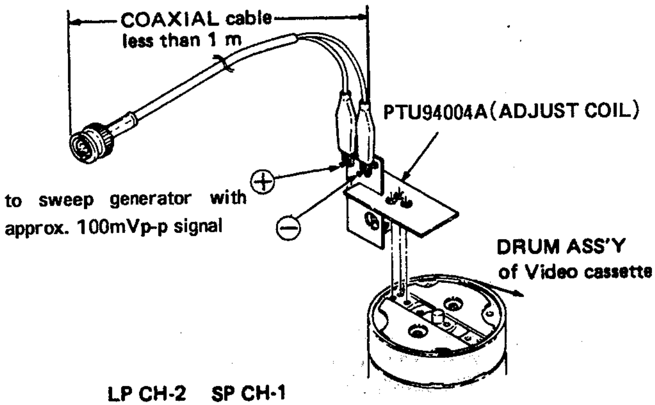

COAXIAL cable less than 1 m
PTU94004A(ADJUST COIL)
to sweep generator with approx. 100mVp-p signal
⊕
⊖
DRUM ASS'Y of Video cassette

Fig. 3-6-2

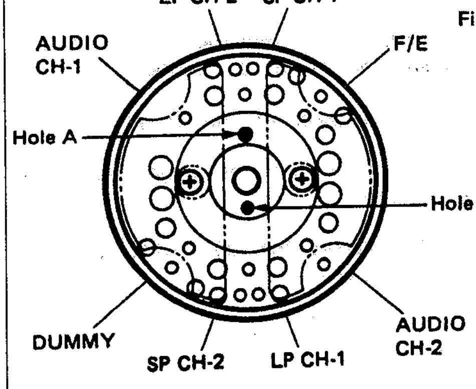
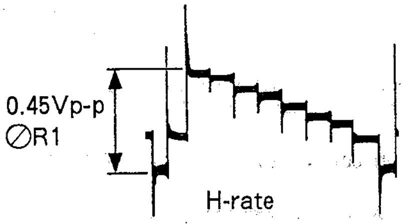
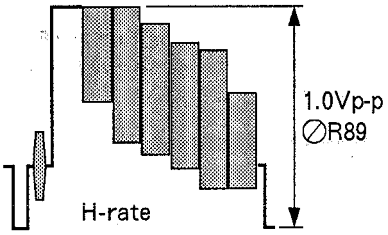
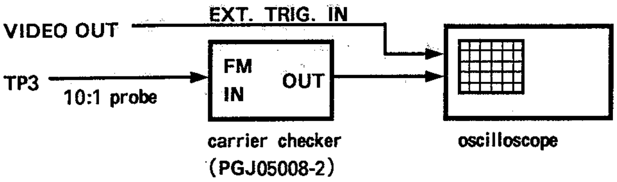
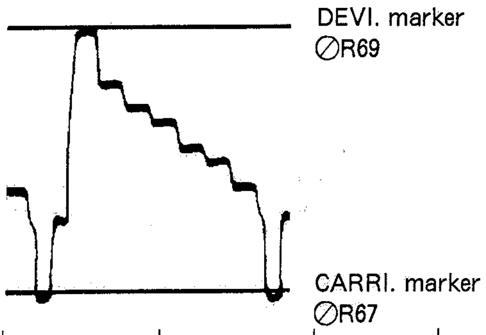

LP CH-2
SP CH-1
AUDIO CH-1
F/E
Hole A
Hole B
DUMMY
SP CH-2
LP CH-1
AUDIO CH-2

Fig. 3-6-3

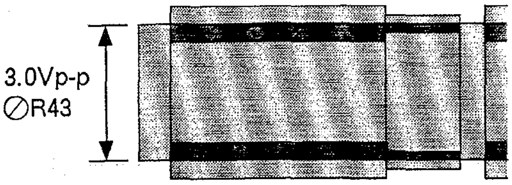
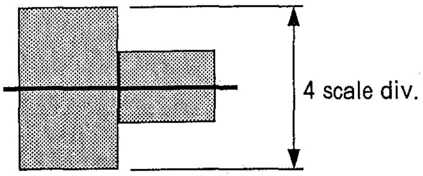
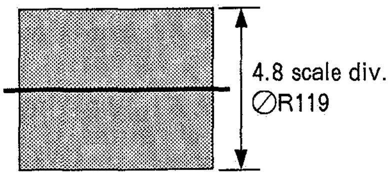
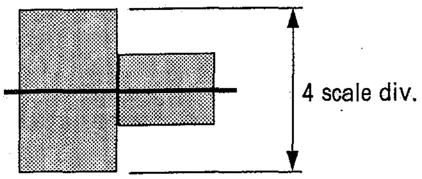
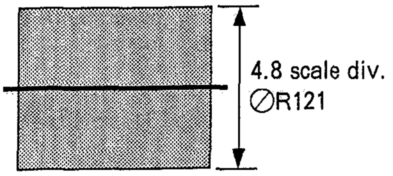
|  |  |  |  |
|---|---|---|---|
| SP | TP4 | CH-1 | ⊘R18 |
|  |  | CH-2 | ⊘R15 |
| LP | TP3 | CH-1 | ⊘R13 |
|  |  | CH-2 | ⊘R12 |

## 3.7 VIDEO CIRCUIT

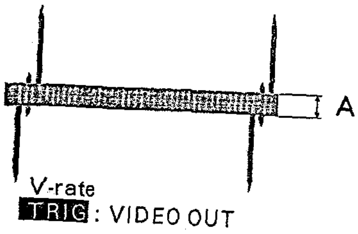
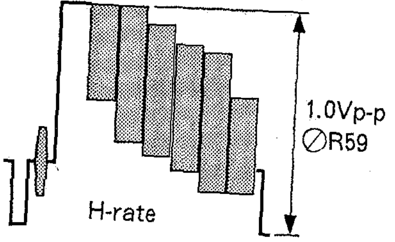
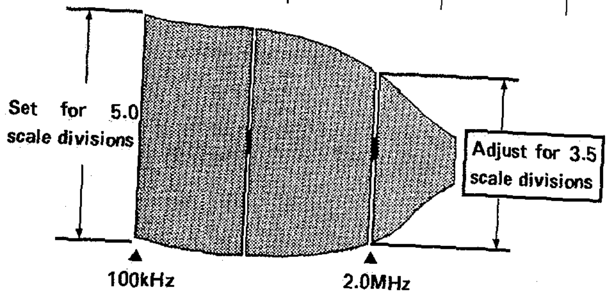
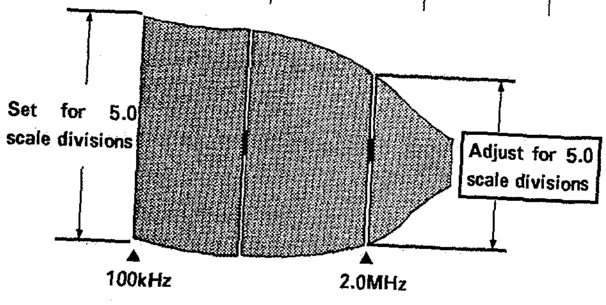
***Note: Unless otherwise specified, all check points and adjustment parts are located on 04 MAIN board.***

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 1 | **AGC level** | TP20<br>TP8 (GND)<br><br> 0.45Vp-p<br>⊘R1<br>H-rate | R1 | Color bar | SP<br>EE | (1) Adjust R1 so that the Y level becomes 0.45Vp-p. |
| 2 | **EE Y level** | VIDEO OUT<br>(75Ω load)<br><br> 1.0Vp-p<br>⊘R89<br>H-rate | R89 | Color bar | SP<br>EE | (1) Adjust R89 so that the Y level becomes 1.0Vp-p. |
| 3 | **Carrier &<br>Deviation** | TP3<br>TP4 (GND)<br>TRIG.<br>VIDEO OUT<br><br> VIDEO OUT<br>EXT. TRIG. IN<br>TP3<br>10:1 probe<br>FM<br>IN<br>OUT<br>carrier checker<br>(PGJ05008-2)<br>oscilloscope<br><br> DEVI. marker<br>⊘R69<br>CARRI. marker<br>⊘R67 | R67<br>R69 | Color bar | SP<br>EE | ***Note: This adjustment has need of a carrier checker (PGJ05008-2).***<br>(1) Make a connection between the oscilloscope and the carrier checker with the 10:1 probe.<br>(2) Set the carrier checker to the "DEVI" mode.<br>(3) Adjust R67 to accord the sync tip with the "CARRI" marker.<br>(4) Adjust R69 to accord the 100% white portion with the "DEVI" marker. |

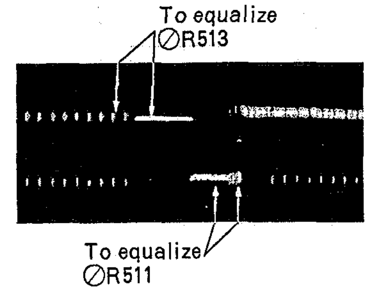
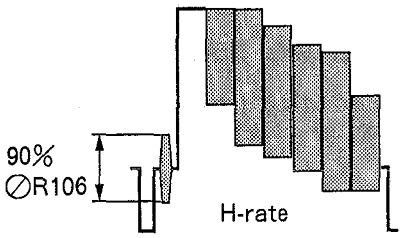
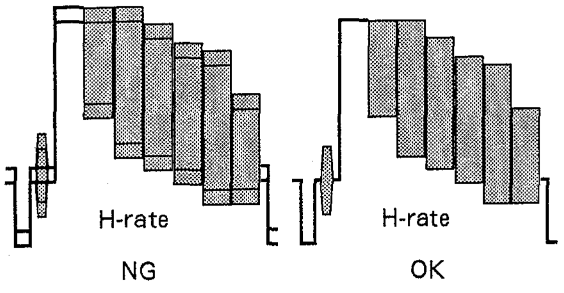
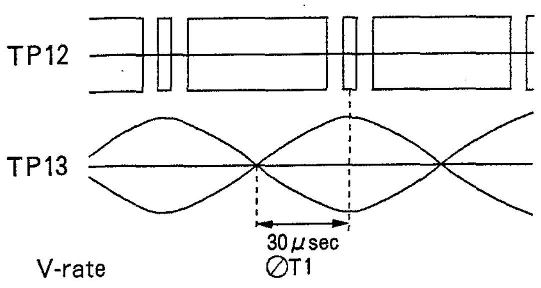
***Note: Unless otherwise specified, all check points and adjustment parts are located on 04 MAIN board.***

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 4 | **REC FM level** | TP6 43 SP<br>TP1(GND) 43<br>TP5 43 LP<br>TRIG.<br>TP32 (D.FF) | R43 | Color bar | SP<br>REC | (1) Trigger the oscilloscope externally with TP32 (D.FF).<br>(2) Adjust R43 so that the FM level is 3.0Vp-p in the pedestal portion. |
| |  | | | | LP<br>REC | (3) Record the color bar signal in LP mode.<br>(4) Confirm the FM level is 2.5±0.5Vp-p. |
| 5 | **REC color level & CH balance** | TP9<br>TP8 (GND)<br>TRIG.<br>TP32 (D.FF)<br> | R119 | MH-2L | PB<br>LP | (1) Playback the color bar segment of the alignment tape MH-2L.<br>(2) Trigger the oscilloscope externally with the TP32 (D.FF).<br>(3) Adjust the oscilloscope's GAIN control to set the higher channel output level at TP9 for 4.0 scale divisions. |
| | |  | | Color bar | LP<br>REC<br>↓<br>PB | (4) Record the color bar signal in the LP mode and play it back.<br>(5) Trigger the oscilloscope externally with the TP32 (D.FF).<br>(6) Adjust R119 so that the level of same channel as the step (3) at TP9 is 4.8 scale divisions (+2dB). |
| | |  | R121 | MHVE-2 | SP<br>PB | (1) Playback the alignment tape MHVE-2.<br>(2) Trigger the oscilloscope externally with the TP32 (D.FF).<br>(3) Adjust the oscilloscope's GAIN control to set the higher channel output level at TP9 for 4.0 scale divisions. |
| | |  | | Color bar | SP<br>REC<br>↓<br>PB | (4) Record the color bar signal in the SP mode and play it back.<br>(5) Trigger the oscilloscope externally with the TP32 (D.FF).<br>(6) Adjust R121 so that the level of same channel as the step (3) at TP9 is 4.8 scale divisions (+2dB). |

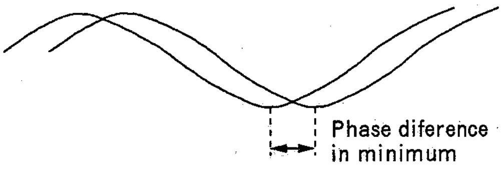
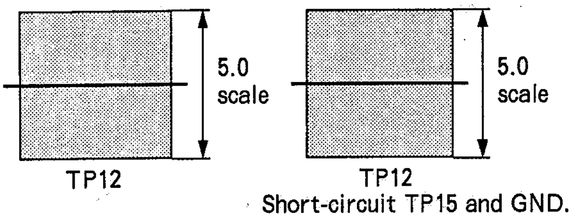
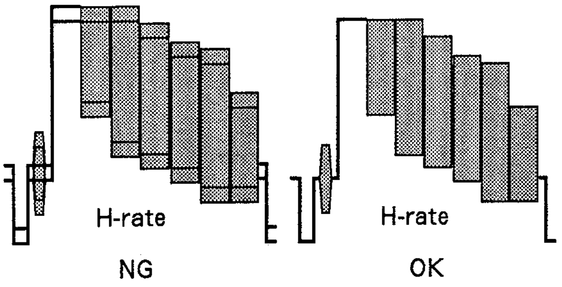
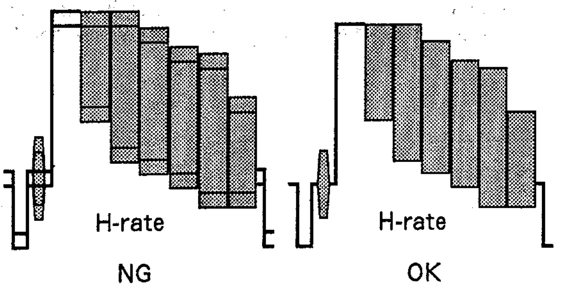
***Note: Unless otherwise specified, all check points and adjustment parts are located on 04 MAIN board.***

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 6 | **Y NR** | TP7<br>TP8 (GND)<br> | R18 | Color bar | SP<br>EE | (1) Set the oscilloscope as follows.<br>Time sweep : 2msec<br>Range : 50mV／DIV<br>(2) Adjust R18 to minimize signal leve "A". |
| 7 | **PB Y level** | VIDEO OUT (75Ω load)<br> | R59 | Color bar | SP<br>REC<br>↓<br>PB | (1) Record the color bar signal in the SP mode and play it back.<br>(2) Adjust R59 so that the Y level becomes 1.0Vp-p. |
| 8 | **Frequency response** | VIDEO OUT (75Ω load)<br>TRIG.<br>TP32 (D.FF)<br> Set for 5.0 scale divisions<br>Adjust for 3.5 scale divisions<br>100kHz<br>2.0MHz<br>**TRIG : TP32 (D-FF) ⊖SLOPE(CH1), ⊕SLOPE(CH2)** | R130 43<br>R15 43 CH-1<br>R18 43 CH-2 | MBVE-3 | PB<br>SP | (1) Playback the alignment tape MBVE-3. Trigger the oscilloscope externally with the TP32 (D.FF).<br>(2) Set the sharpness VR to center click position.<br>(3) Connect the oscilloscope to TP31 (PB RF) while adjusting the TRACKING control to maximize the FM waveform.<br>(4) Connect the oscilloscope to VIDEO OUT and adjust the oscilloscope's GAIN control to set the 100kHz signal level of lower channel for 5.0 scale divisions on the scope.<br>(5) Adjust R130 so that the 2.0MHz signal level of the same channel as the step (4) is 3.5 scale divisions (−3.0dB) respectively.<br>(6) Adjust R15 (CH-1) or R18 (CH-2) so that the higher level channel to equalize the lower level channel. |
|  |  |  Set for 5.0 scale divisions<br>Adjust for 5.0 scale divisions<br>100kHz<br>2.0MHz<br>**TRIG : TP32 (D-FF) ⊕SLOPE(CH1), ⊖SLOPE(CH2)** | R131 43<br>R13 43 CH-1<br>R12 43 CH-2 | Video sweep | LP<br>REC<br>↓<br>PB | (1) Record the video sweep signal in the LP mode and play it back. Trigger the oscilloscope externally with the TP32 (D.FF).<br>(2) Set the sharpness VR to center click position and set the TRACKING control to the preset position by simultaneously pressing the ⊞ and ⊟ TRACKING buttons.<br>(3) Adjust the oscilloscope's GAIN control to set the 100kHz signal level of lower channel for 5.0 scale divisions on the scope.<br>(4) Adjust R131 so that the 2.0MHz signal level of the same channel as the step (3) is 5.0 scale divisions (±0 dB) respectively.<br>(5) Adjust R13 (CH-1) or R12 (CH-2) so that the higher level channel to equalize the lower level channel. |

*Note: Unless otherwise specified, all check points and adjustment parts are located on 04 MAIN board.*

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 9 | **V pulse**<br> | VIDEO OUT<br>(75Ω load)<br>TRIG.<br>TP32 (D.FF) | R511 08<br>R513 08 | Color bar | SP<br>REC<br>↓<br>PB | (1) Set the V.PULSE SW (Rear panel) to ON.<br>(2) Adjust R511 so that the sync tip of V.pulse to equalize the sync tip of V.sync.<br>(3) Adjust R513 so that the pedestal of V.pulse to equalize the pedestal of V.sync.<br>(4) Set the V.PULSE SW (Rear panel) to OFF. |
| 10 | **PB burst level**<br> | VIDEO OUT<br>(75Ω load) | R106 | Color bar | SP<br>EE<br>SP<br>REC<br>↓<br>PB | (1) Adjust the oscilloscope's GAIN control to set the burst level of input color bar signal for 5.0 scale divisions on the scope.<br>(2) Record the color bar signal in the SP mode and play it back.<br>(3) Adjust R106 so that the burst level becomes 4.5 scale divisions (90%). |
| 11 | **2H DL Y level**<br> | VIDEO OUT<br>(75Ω load) | R156 | Color bar | SP<br>REC<br>↓<br>STILL | (1) Record the color bar signal in the SP mode and play it back in the STILL mode.<br>(2) Adjust R156 so that no vertical dancing. |
| 12 | **APC error phase**<br> | TP12<br>TP13<br>TP14 (GND) | T1<br>TRIG.<br>VIDEO OUT | Color bar | SP<br>REC<br>↓<br>PB | (1) Set the oscilloscope to CHOP mode. Trigger the oscilloscope externally (⊕ slope) with the TP5 (VIDEO OUT).<br>(2) Adjust T1 to position the zero-cross 30±3μsec from the center of the burst signal as shown in the figure. |

***Note: Unless otherwise specified, all check points and adjustment parts are located on 04 MAIN board.***

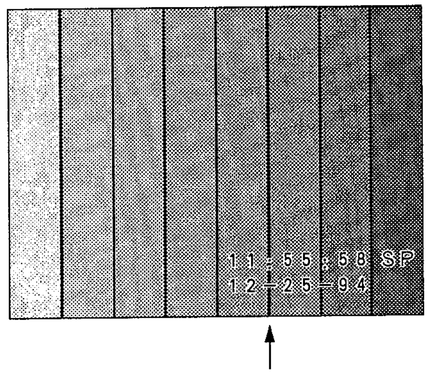
| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 13 | **0.5H DL JUMP DET** | TP16<br>TP4 (GND)<br>↓<br>frequency counter | R164<br>TP16 \| 30 ± 0.2 kHz \| ⌀R164 | No signal | EE | (1) Connect the shorting wire to between TP17 and TP21.<br>(2) Adjust R164 for 30±0.2kHz. |
| 14 | **Inverted color phase**<br> | TP12<br>TP22<br>TP4 (GND)<br>TRIG. TP22 | L41 | 100% Chroma | LP<br>REC<br>↓<br>STILL | (1) Connect the oscilloscope to between TP12 and TP22. Set the oscilloscope to CHOP mode.<br>(2) Adjust L41 so that phase difference in minimum. |
| 15 | **Inverted color level**<br> 5.0 scale<br>5.0 scale<br>TP12<br>TP12<br>Short-circuit TP15 and GND. | TP12<br>TP4 (GND)<br>TRIG.<br>TP32 (D.FF) | R163 | Color bar | LP<br>REC<br>↓<br>PB | (1) Adjust the oscilloscope's GAIN control to set the color level of TP12 for 5.0 scale divisions on the scope.<br>(2) Short circuit between TP15 and GND.<br>(3) Adjust R163 so that the color level becomes 5.0 scale divisions on the scope. |
| 16 | **0.5H DL Y level**<br> | VIDEO OUT (75Ω load) | R195 | Color bar | LP<br>REC<br>↓<br>STILL | (1) Adjust R195 to minimize the vertical dancing in the color bar waveform. |
| 17 | **0.25H DL Y level**<br> | VIDEO OUT (75Ω load) | R125<br>R140 | Color bar | LP<br>REC<br>↓<br>STILL | (1) Alternately adjust R125 and R140 to minimize the vertical dancing in the color bar waveform. |

*Note: Unless otherwise specified, all check points and adjustment parts are located on* **04** ***MAIN board.***

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 18 | **0.25H DL**<br>**color level** | VIDEO OUT<br>(75Ω load)<br>↓<br>Vectorscope | C156 | Color bar | LP<br>REC<br>↓<br>STILL | (1) Adjust C156 to minimize the level difference in the magenta portion. |

## 3.8 OS DATA/BATTERY CIRCUIT

*Note: Unless otherwise specified, all check points and adjustment parts are located on* **74** ***OSD/BATTERY-1 board.***

| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 1 | **ON SCREEN**<br>**position**<br> 11:55:58 SP<br>12-25-94 | VIDEO OUT | C6 74 | Color bar | EE | (1) Connect the TV monitor to the VIDEO OUT.<br>(2) Set the ON SCREEN switch to ON.<br>(3) Move the ON SCREEN display to the rightmost position in the screen while pressing the ON SCREEN POSITION switch. (Push "POS H" button 18 times.)<br>(4) Adjust C6 to position colon between the hour and minute indications on the boundary line between red and magenta of the color bars while observing the TV monitor.<br>(5) While turning the ON SCREEN BRIGHTNESS control, confirm that the brightness of the display changes as the VR is turned.<br>After the confirmation, make sure to reset the BRIGHTNESS VR to the center position. |

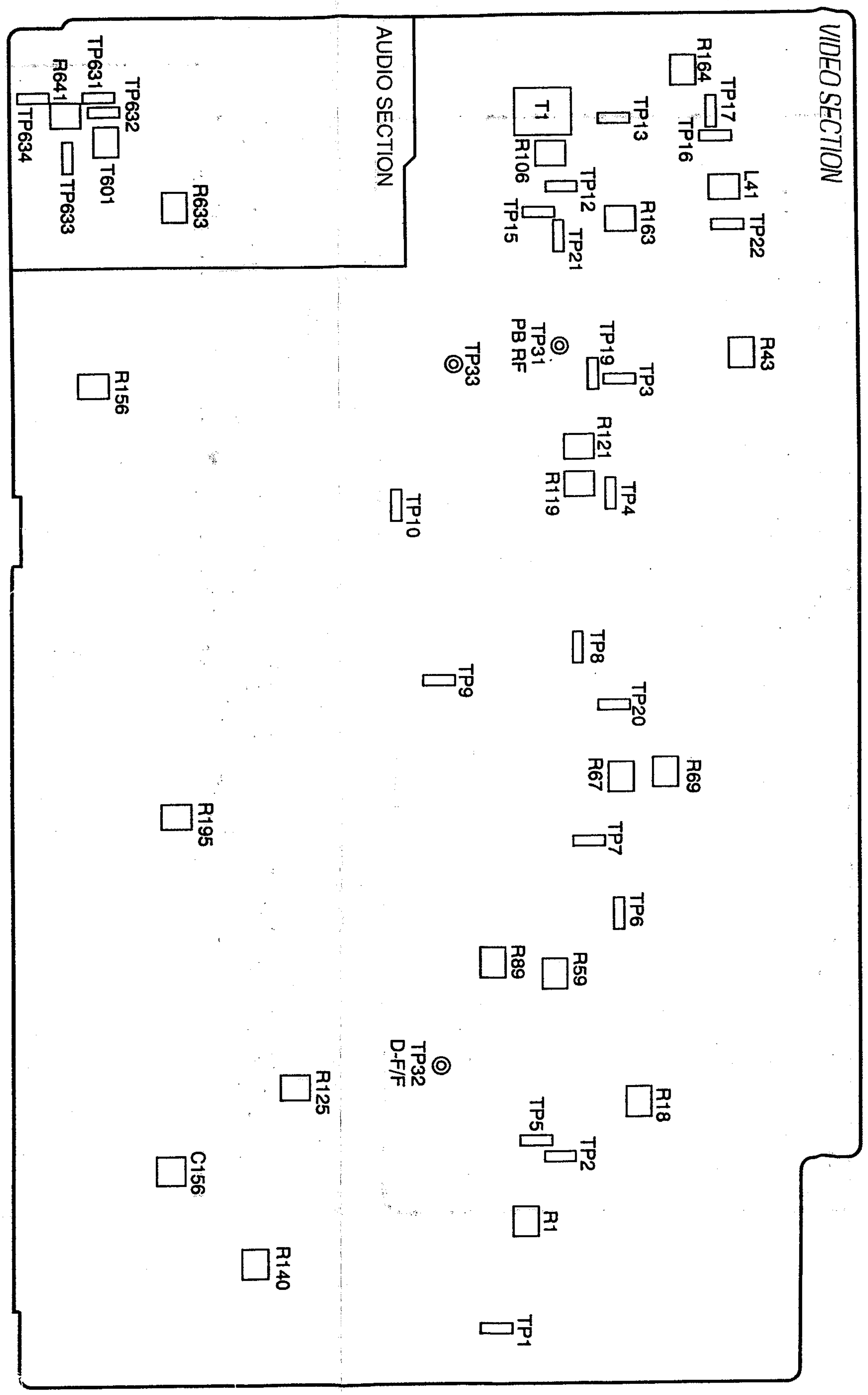
## 3.9 TIMER CIRCUIT

*Note: Unless otherwise specified, all check points and adjustment parts are located on* **79** ***TIMER board.***

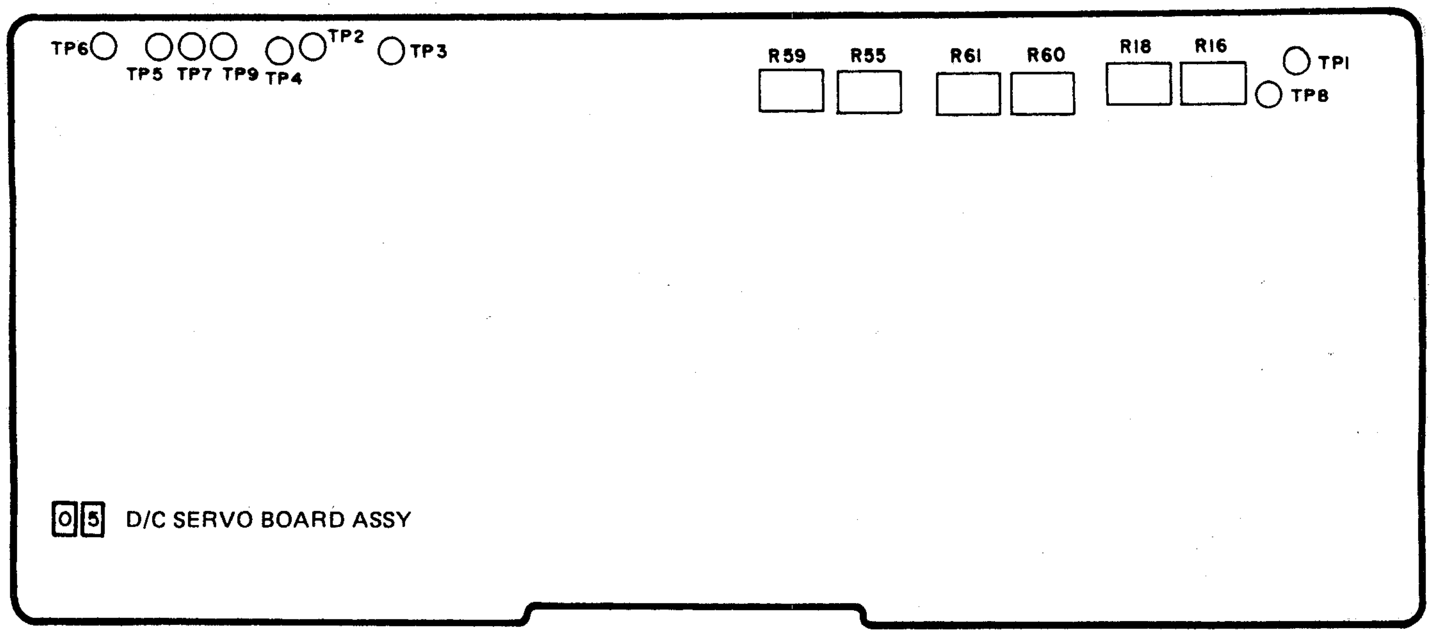
| No. | Item | Check Point | Adjustments | Signal | Mode | Description |
|---|---|---|---|---|---|---|
| 1 | **TIMER CPU**<br>**clock** | TP4<br>↓<br>frequency counter | C12 | No signal | EE | (1) Disconnect the power cord from the AC outlet.<br>(2) Supply 5.3V$_{DC}$ to the CN1-pin⑤ and the TPG both of the OSD/BATTERY-1 board.<br>(3) Connect the frequency counter to TP4.<br>(4) Shortcircuit between TP1 and GND.<br>(5) Shortcircuit TP2 and GND once in order to reset the CPU.<br>(6) Adjust C12 for 2048.000±0.002Hz (488.2813±0.0002 $\mu$sec).<br>(7) After the adjustment, Remove the shorting wires and disconnect the external power supply.<br>***Note: After this adjustment is complete, make sure to set the TIME DATE DATA once again since this adjustment procedure the stored data set previously.*** |

## ■ Location of TP & VR

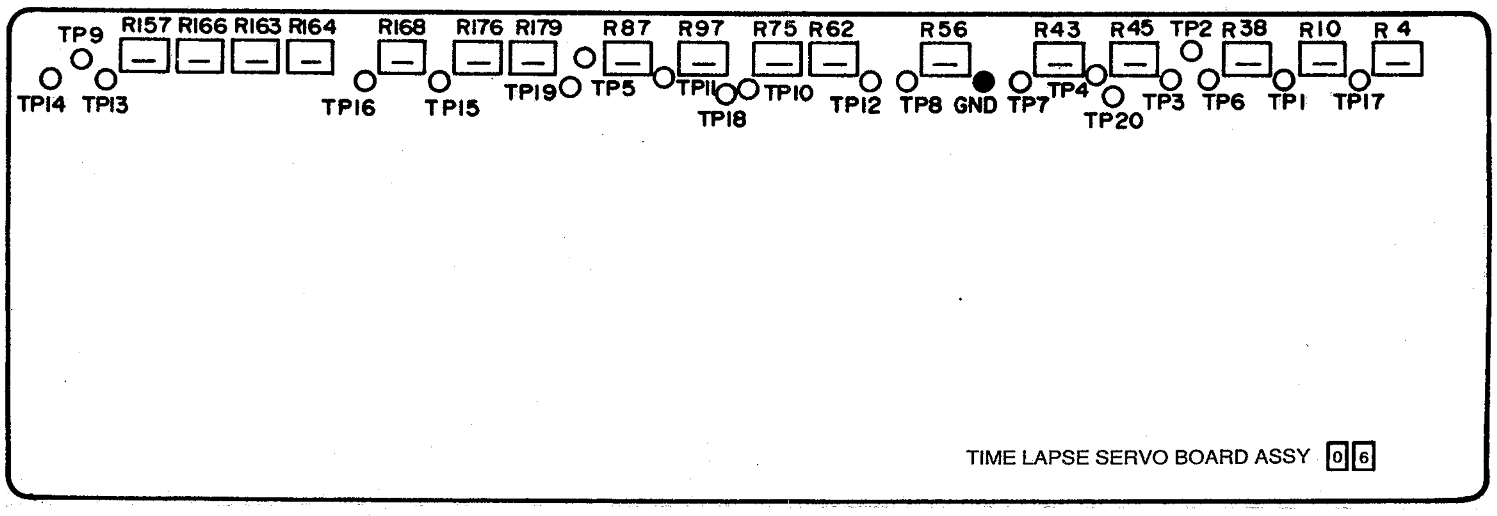
### — 04 MAIN —


AUDIO SECTION
VIDEO SECTION
TP631
TP632
R641
TP634
T601
TP633
R633
T1
R106
TP13
R164
TP17
TP16
TP12
TP15
TP21
R163
L41
TP22
TP33
TP31
PB RF
TP19
TP3
R43
R156
R121
R119
TP4
TP10
TP8
TP9
TP20
R67
R69
R195
TP7
TP6
R89
R59
TP32
D-F/F
R125
R18
TP5
TP2
C156
R1
R140
TP1

## — 05 D/C SERVO —


TP6
TP5
TP7
TP9
TP4
TP2
TP3
R59
R55
R61
R60
R18
R16
TP1
TP8
05 D/C SERVO BOARD ASSY

## — 06 TL SERVO —


TP9
R157 R166 R163 R164
R168
R176 R179
R87
R97
R75 R62
R56
R43
R45
TP2
R38
R10
R 4
TP14
TP13
TP16
TP15
TP19
TP5
TP11
TP18
TP10
TP12
TP8
GND
TP7
TP4
TP20
TP3
TP6
TP1
TP17
TIME LAPSE SERVO BOARD ASSY 06

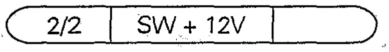
# SECTION 4
# DIAGRAM AND CIRCUIT BOARDS

## 4.1 FOREWORD

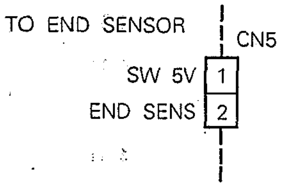
### 4.1.1 Expression of wiring

Wiring is expressed in three ways.

1) Wiring on the same board.



2)



3) Expression of connectors in the overall wiring diagram. The following illustrates "CN1 pin 1, 2 and 3".

| CN1 | |
|---|---|
| 1 | SEMI REG 15V |
| 2 | GND |
| 3 | SEMI REG 7V |

### 4.1.2 Signal flow on the diagram

The following arrow marks indicate the specified signal parts respectively.

➡ : RECORDING or E-E SIGNAL PATH
⇨ : PLAYBACK SIGNAL PATH
➪ : REC/PLAY SIGNAL PATH

### 4.1.3 Measurement of voltage and waveform

1) Voltage
Measured by digital voltmeter both in the VHS SP REC and VHS SP PLAY BACK mode.

2) Waveform
VIDEO: Unless otherwise indicated, (a) color bars signal input through VIDEO IN terminal in REC, (b) color bars signal in PB.

**Note:** Indicated voltage were measured as directly at respective pins of semiconductors and connectors.

### 4.1.4 Unit of value

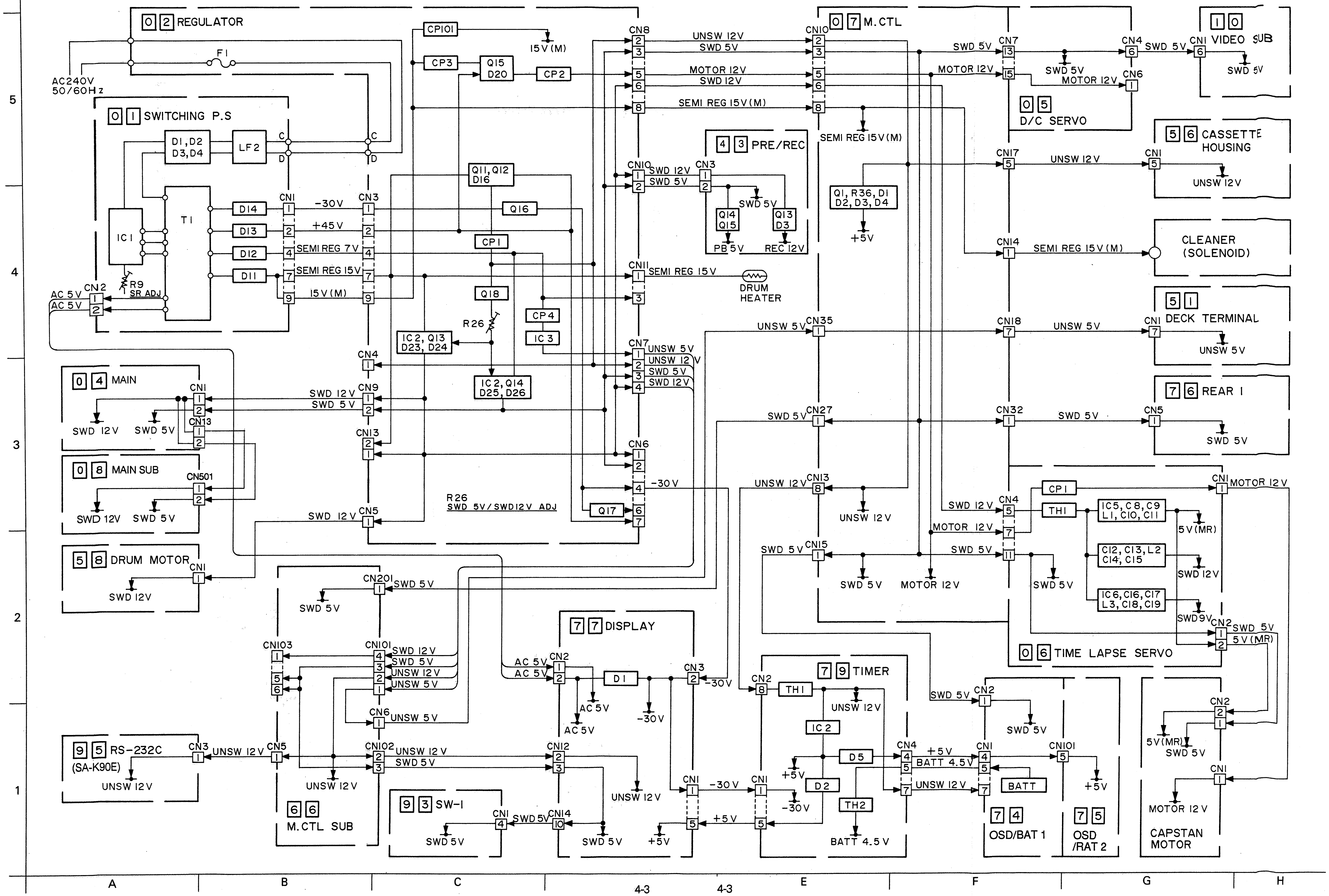
Unless otherwise specified:

1) Resistance is in Ω (1/6 W, 1/8 W).
2) Capacitance in μF.
3) Inductance in μH.
4) All diodes are 1SS133.

### 4.1.5 Circuit board locations

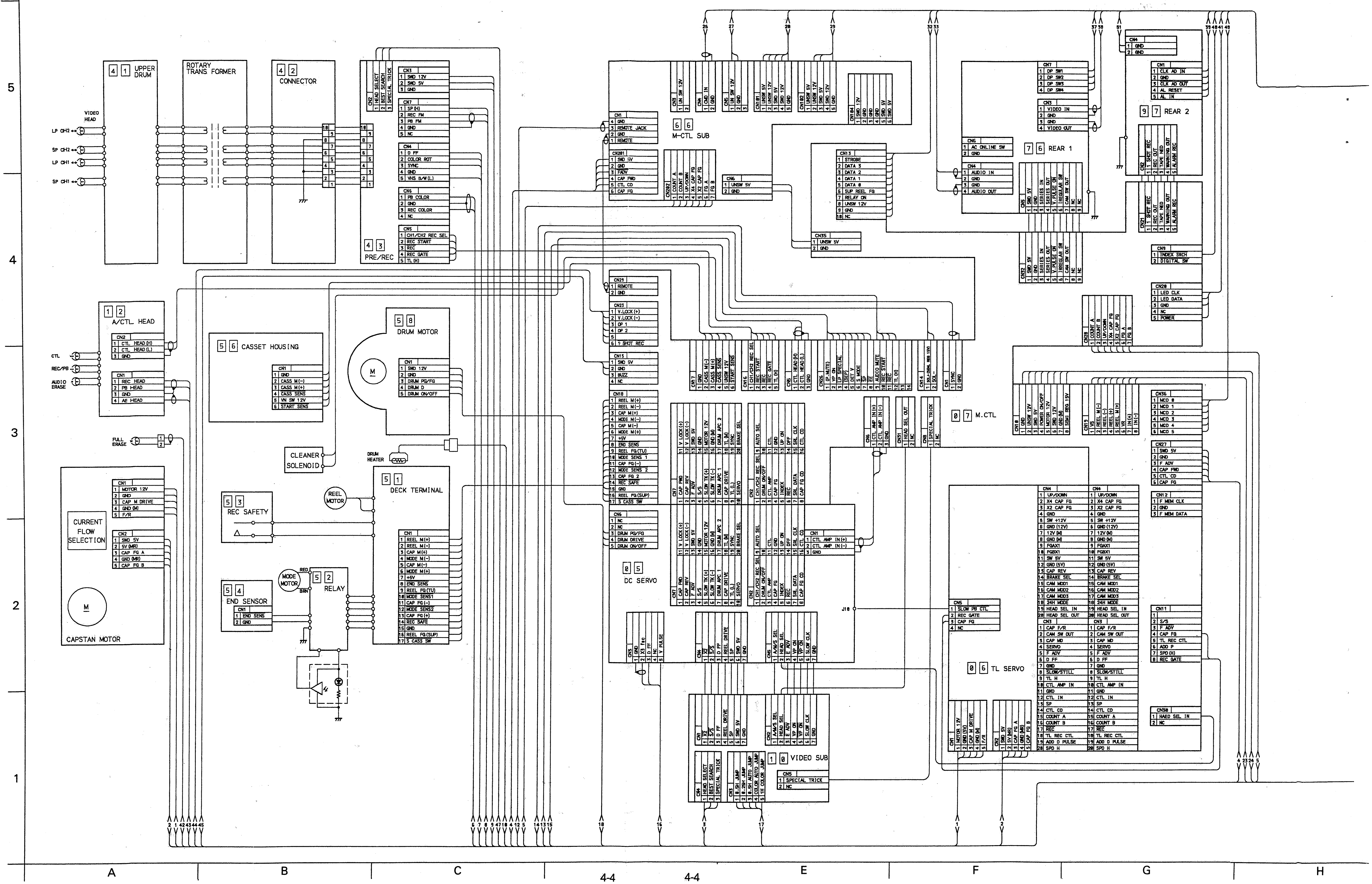
| Board No. | Board Name | Page of diagram | | | |
|---|---|---|---|---|---|
| | | Block diagram | Schematic diagram | Circuit board | Parts list |
| 01 | SWITCHING POWER SUPPLY | 4-3 | 4-12 | 4-13 | 6-2 |
| 02 | REGULATOR | 4-3 | 4-12 | 4-13 | 6-3 |
| 04 | MAIN (VIDEO) | 4-6 | 4-14 | 4-17 | 6-4 |
| 04 | MAIN (AUDIO) | 4-10 | 4-16 | 4-17 | 6-10 |
| 05 | D/C SERVO | 4-9 | 4-18 | 4-19 | 6-11 |
| 06 | TIMELAPSE SERVO | 4-8 | 4-20,21 | 4-23 | 6-12 |
| 07 | MECHACON | 4-11 | 4-24,25 | 4-26,27 | 6-15 |
| 08 | MAIN SUB | 4-6 | 4-32 | 4-33 | 6-18 |
| 10 | VIDEO SUB | — | 4-34 | 4-34 | 6-18 |
| 12 | A/C HEAD | 4-10 | 4-4 | 4-41 | 6-19 |
| 41 | UPPER DRUM | 4-7 | 4-4 | — | 5-5 |
| 43 | VIDEO PRE/REC | 4-7 | 4-30,31 | 4-31 | 6-19 |
| 51 | DECK TERMINAL | 4-11 | 4-41 | 4-41 | 6-21 |
| 52 | RELAY | 4-11 | 4-41 | 4-41 | 6-21 |
| 53 | REC SAFETY | 4-11 | 4-41 | 4-41 | 6-21 |
| 54 | END SENSOR | 4-11 | 4-41 | 4-41 | 6-22 |
| 56 | CASSETTE HOUSING | 4-11 | 4-41 | 4-41 | 6-22 |
| 61 | D-SUB CONN. optional SA-K90E | — | 4-50 | 4-50 | 3 (SA-K90E) |
| 65 | STEP | — | 4-44 | 4-45 | 6-25 |
| 66 | MECHACON SUB | — | 4-28 | 4-29 | 6-22 |
| 74 | OS DATA/BATTERY 1 | — | 4-36 | 4-37 | 6-23 |
| 75 | OS DATA/BATTERY 2 | — | 4-36 | 4-37 | 6-23 |
| 76 | REAR-1 | — | 4-35 | 4-35 | 6-24 |
| 77 | DISPLAY | — | 4-38,39 | 4-40 | 6-24 |
| 79 | TIMER | — | 4-42 | 4-43 | 6-25 |
| 92 | OPERATION | — | 4-44 | 4-45 | 6-27 |
| 93 | SWITCH-1 | — | 4-46 | 4-47 | 6-27 |
| 95 | RS-232C optional SA-K90E | — | 4-48 | 4-49 | 3 (SA-K90E) |
| 96 | SWITCH-2 | — | 4-38 | 4-47 | 6-28 |
| 97 | REAR-2 | — | 4-50 | 4-50 | 6-28 |

## 4.2 POWER SYSTEM BLOCK DIAGRAM

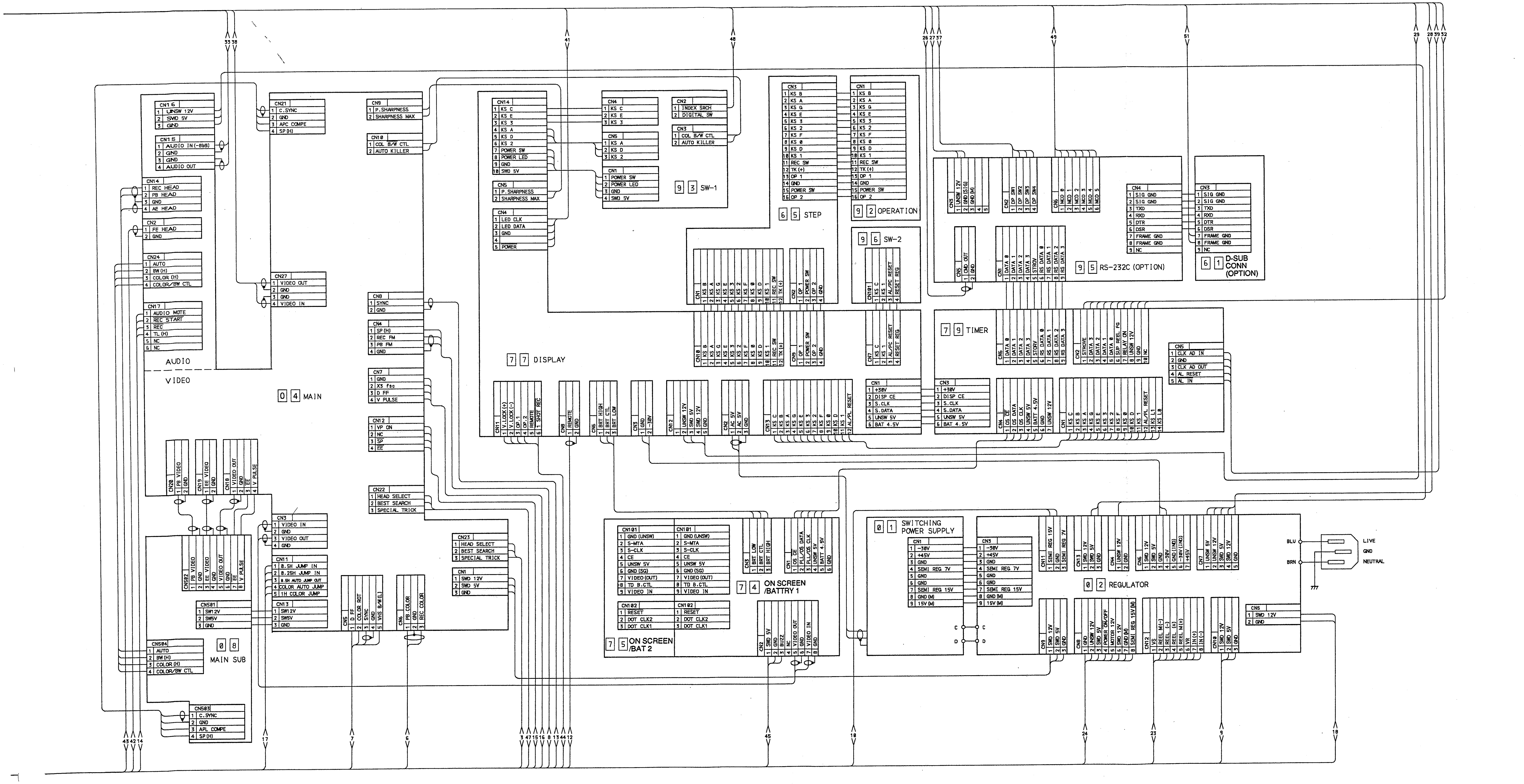


02 REGULATOR
AC240V 50/60Hz
F1
01 SWITCHING P.S
D1, D2 D3, D4
LF2
IC1
T1
R9 SR ADJ
D14
D13
D12
D11
CN1
CN2
CN3
AC 5V
-30V
+45V
SEMI REG 7V
SEMI REG 15V
15V (M)
CP101
15V (M)
CP3
Q15 D20
CP2
Q11, Q12 D16
Q16
CP1
Q18
R26
CP4
IC3
IC2, Q13 D23, D24
IC2, Q14 D25, D26
Q17
R26 SWD 5V/SWD12V ADJ
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
CN13
UNSW 12V
SWD 5V
MOTOR 12V
SWD 12V
SEMI REG 15V(M)
UNSW 5V
DRUM HEATER
43 PRE/REC
Q14 Q15
Q13 D3
PB 5V
REC 12V
04 MAIN
SWD 12V
SWD 5V
08 MAIN SUB
CN501
58 DRUM MOTOR
95 RS-232C (SA-K90E)
66 M.CTL SUB
CN103
CN101
CN102
CN201
93 SW-I
77 DISPLAY
D1
AC 5V
07 M.CTL
Q1, R36, D1 D2, D3, D4
+5V
CN35
CN27
CN13
CN15
05 D/C SERVO
CN7
CN4
CN6
CN14
CN17
CN18
CN32
10 VIDEO SUB
56 CASSETTE HOUSING
CLEANER (SOLENOID)
51 DECK TERMINAL
76 REAR 1
06 TIME LAPSE SERVO
CP1
TH1
IC5, C8, C9 L1, C10, C11
C12, C13, L2 C14, C15
IC6, C16, C17 L3, C18, C19
5V(MR)
SWD 9V
79 TIMER
TH1
IC2
D5
D2
TH2
BATT 4.5V
+5V
74 OSD/BAT 1
BATT
75 OSD /RAT 2
CAPSTAN MOTOR
CN12
CN14
6
5
4
3
2
1
A
B
C
D
E
F
G
H

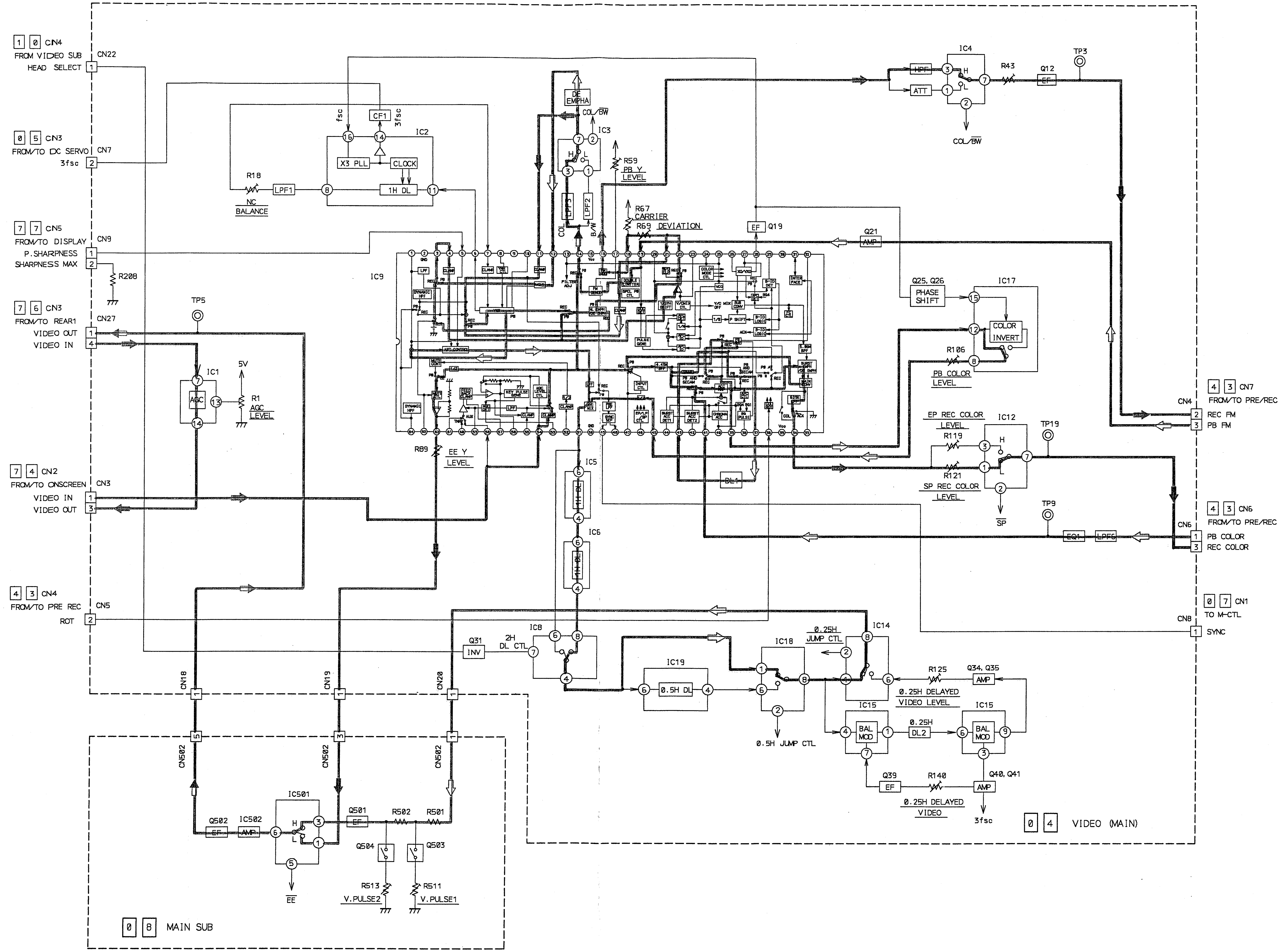
## 4.3 OVERALL WIRING DIAGRAM



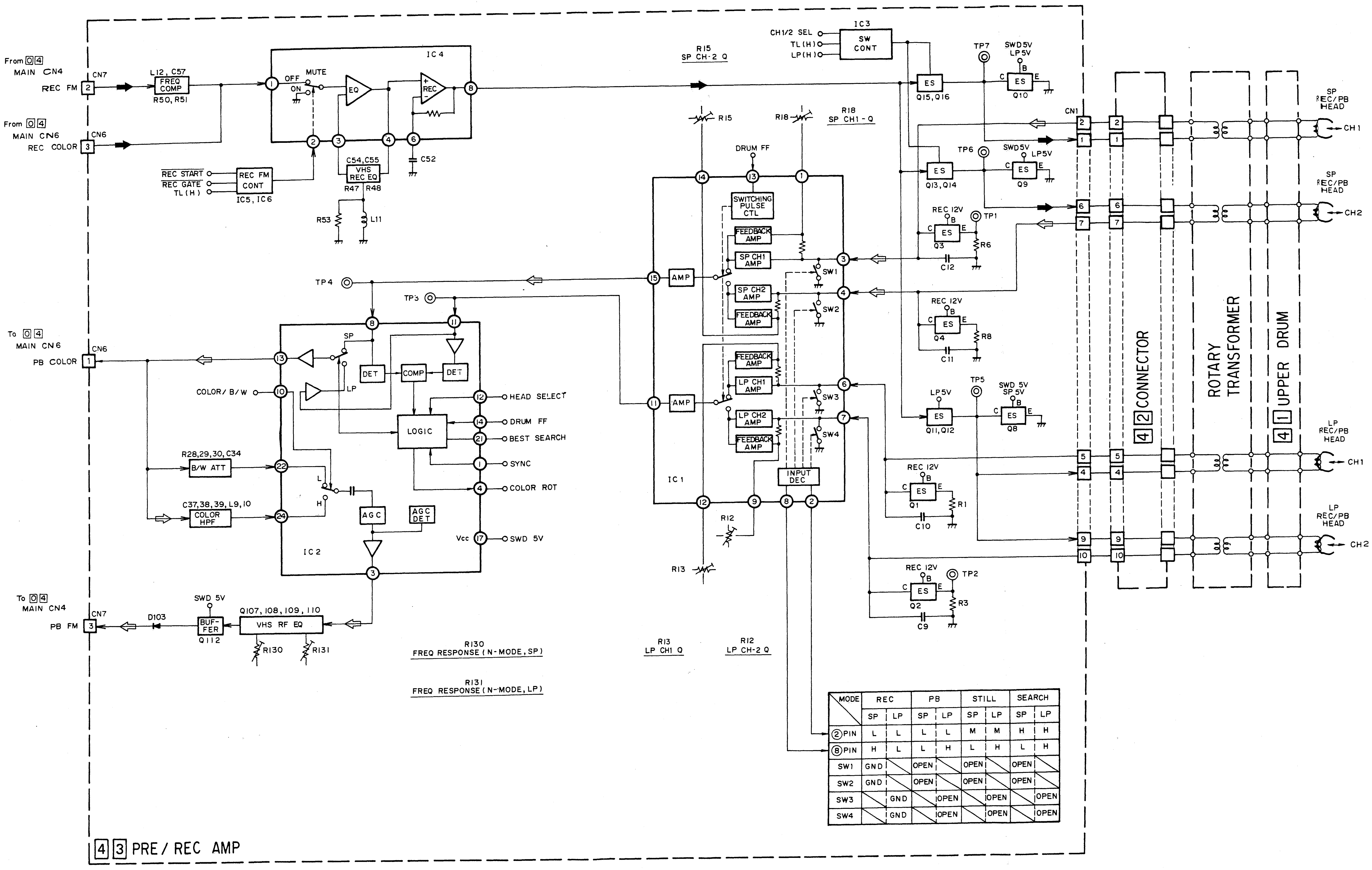
4 1 UPPER DRUM
ROTARY TRANS FORMER
4 2 CONNECTOR
4 3 PRE/REC
6 6 M-CTL SUB
7 6 REAR 1
9 7 REAR 2
1 2 A/CTL. HEAD
5 6 CASSET HOUSING
5 8 DRUM MOTOR
CLEANER SOLENOID
DRUM HEATER
5 1 DECK TERMINAL
5 3 REC SAFETY
REEL MOTOR
MODE MOTOR
5 2 RELAY
5 4 END SENSOR
CURRENT FLOW SELECTION
CAPSTAN MOTOR
0 5 DC SERVO
0 7 M.CTL
0 6 TL SERVO
1 0 VIDEO SUB
VIDEO HEAD
LP CH2
SP CH2
LP CH1
SP CH1
CTL
REC/PB
AUDIO ERASE
FULL ERASE
A
B
C
E
F
G
H
1
2
3
4
5
6


33 38
41
48
26 27 37
49
51
29 28 39 32
CN16 1 UNSW 12V 2 SWD 5V 3 GND
CN15 1 AUDIO IN(-8bB) 2 GND 3 GND 4 AUDIO OUT
CN14 1 REC HEAD 2 PB HEAD 3 GND 4 AE HEAD
CN2 1 FE HEAD 2 GND
CN24 1 AUTO 2 BW(H) 3 COLOR (H) 4 COLOR/BW CTL
CN17 1 AUDIO MOTE 2 REC START 3 REC 4 TL(H) 5 NC 6 NC
AUDIO
VIDEO
CN21 1 C.SYNC 2 GND 3 APC COMPE 4 SP(H)
CN27 1 VIDEO OUT 2 GND 3 GND 4 VIDEO IN
CN9 1 P.SHARPNESS 2 SHARPNESS MAX
CN10 1 COL B/W CTL 2 AUTO KILLER
CN8 1 SYNC 2 GND
CN4 1 SP(H) 2 REC FM 3 PB FM 4 GND
CN7 1 GND 2 X3 fsc 3 D FF 4 V PULSE
CN12 1 VP ON 2 NC 3 SP 4 EE
CN22 1 HEAD SELECT 2 BEST SEARCH 3 SPECIAL TRICK
0 4 MAIN
CN20 1 PB VIDEO 2 GND
CN19 1 EE VIDEO 2 GND
CN18 1 VIDEO OUT 2 GND 3 EE 4 V PULSE
CN3 1 VIDEO IN 2 GND 3 VIDEO OUT 4 GND
CN11 1 0.5H JUMP IN 2 0.25H JUMP IN 3 0.5H AUTO JUMP OUT 4 COLOR AUTO JUMP 5 1H COLOR JUMP
CN13 1 SW12V 2 SW5V 3 GND
CN5 1 D FF 2 COLOR ROT 3 SYNC 4 GND 5 VHS B/W(L)
CN6 1 PB.COLOR 2 GND 3 REC COLOR
CN23 1 HEAD SELECT 2 BEST SEARCH 3 SPECIAL TRICK
CN1 1 SWD 12V 2 SWD 5V 3 GND
CN502 1 PB VIDEO 2 GND 3 EE VIDEO 4 GND 5 VIDEO OUT 6 GND 7 EE 8 V PULSE
CN501 1 SW12V 2 SW5V 3 GND
CN504 1 AUTO 2 BW(H) 3 COLOR (H) 4 COLOR/BW CTL
0 8 MAIN SUB
CN503 1 C.SYNC 2 GND 3 APL COMPE 4 SP(H)
CN14 1 KS C 2 KS E 3 KS 3 4 KS A 5 KS D 6 KS 2 7 POWER SW 8 POWER LED 9 GND 10 SWD 5V
CN5 1 P.SHARPNESS 2 SHARPNESS MAX
CN4 1 LED CLK 2 LED DATA 3 GND 4 5 POWER
CN4 1 KS C 2 KS E 3 KS 3
CN5 1 KS A 2 KS D 3 KS 2
CN1 1 POWER SW 2 POWER LED 3 GND 4 SWD 5V
CN2 1 INDEX SRCH 2 DIGITAL SW
CN3 1 COL B/W CTL 2 AUTO KILLER
9 3 SW-1
CN3 1 KS B 2 KS A 3 KS G 4 KS E 5 KS 3 6 KS 2 7 KS F 8 KS 0 9 KS D 10 KS 1 11 REC SW 12 TK(+) 13 OP 1 14 GND 15 POWER SW 16 OP 2
6 5 STEP
CN1 1 KS B 2 KS A 3 KS G 4 KS E 5 KS 3 6 KS 2 7 KS F 8 KS 0 9 KS D 10 KS 1 11 REC SW 12 TK(+) 13 OP 1 14 GND 15 POWER SW 16 OP 2
9 2 OPERATION
CN1 1 KS B 2 KS A 3 KS G 4 KS E 5 KS 3 6 KS 2 7 KS F 8 KS 0 9 KS D 10 KS 1 11 REC SW 12 TK(+)
CN2 1 OP 1 2 POWER SW 3 OP 2 4 GND
9 6 SW-2
CN101 1 KS C 2 KS 1 3 AL/PC RESET 4 RESET REG
CN10 1 KS B 2 KS A 3 KS G 4 KS E 5 KS 3 6 KS 2 7 KS F 8 KS 0 9 KS D 10 KS 1 11 REC SW 12 TK(+)
CN9 1 OP 1 2 POWER SW 3 OP 2 4 GND
CN7 1 KS C 2 KS 1 3 AL/PC RESET 4 RESET REG
7 7 DISPLAY
CN11 1 V.LOCK(+) 2 V.LOCK(-) 3 OP.1 4 OP.2 5 REMOTE 6 1 SHOT REC
CN8 1 REMOTE 2 GND
CN6 1 BRT HIGH 2 BRT CTL 3 BRT LOW
CN3 1 GND 2 -30V
CN12 1 2 UNSW 12V 3 SWD 5V 4 SWD 12V 5 GND
CN2 1 AC 5V 2 AC 5V 3 GND
CN13 1 KS C 2 KS B 3 KS A 4 KS G 5 KS E 6 KS 3 7 KS 2 8 KS F 9 KS 0 10 KS D 11 KS 1 12 AL/PL RESET
CN1 1 +30V 2 DISP CE 3 S.CLK 4 S.DATA 5 UNSW 5V 6 BAT 4.5V
CN3 1 UNSW 12V 2 GND (SIG) 3 GND (M) 4 5
CN2 1 DP SW1 2 DP SW2 3 DP SW3 4 DP SW4
CN6 1 MCD 0 2 MCD 1 3 MCD 2 4 MCD 3 5 MCD 4 6 MCD 5
CN5 1 CMD OUT 2 GND
CN1 1 DATA 0 2 DATA 1 3 DATA 2 4 DATA 3 5 STROV 6 RS DATA 0 7 RS DATA 1 8 RS DATA 2 9 RS DATA 3
CN4 1 SIG GND 2 SIG GND 3 TXD 4 RXD 5 DTR 6 DSR 7 FRAME GND 8 FRAME GND 9 NC
9 5 RS-232C (OPTION)
CN3 1 SIG GND 2 SIG GND 3 TXD 4 RXD 5 DTR 6 DSR 7 FRAME GND 8 FRAME GND 9 NC
6 1 D-SUB CONN (OPTION)
7 9 TIMER
CN6 1 DATA 0 2 DATA 1 3 DATA 2 4 DATA 3 5 STORV 6 RS DATA 0 7 RS DATA 1 8 RS DATA 2 9 RS DATA 3
CN2 1 STROVE 2 DATA 3 3 DATA 2 4 DATA 1 5 DATA 0 6 SUP REEL FG 7 RELAY ON 8 UNSW 12V 9 GND 10 NC
CN5 1 CLK AD IN 2 GND 3 CLK AD OUT 4 AL RESET 5 AL IN
CN3 1 +30V 2 DISP CE 3 S.CLK 4 S.DATA 5 UNSW 5V 6 BAT 4.5V
CN4 1 OS CE 2 OS DATA 3 OS CLK 4 UNSW 5V 5 BATT 4.5V 6 GND 7 UNSW 12V
CN1 1 KS C 2 KS B 3 KS A 4 KS G 5 KS E 6 KS 3 7 KS 2 8 KS F 9 KS 0 10 KS D 11 KS 1 12 AL/PL RESET 13 KS L1 14 KS L0
CN101 1 GND (UNSW) 2 S-MTA 3 S-CLK 4 CE 5 UNSW 5V 6 GND (SG) 7 VIDEO (OUT) 8 TD B.CTL 9 VIDEO IN
CN101 1 GND (UNSW) 2 S-MTA 3 S-CLK 4 CE 5 UNSW 5V 6 GND (SG) 7 VIDEO (OUT) 8 TD B.CTL 9 VIDEO IN
CN102 1 RESET 2 DOT CLK2 3 DOT CLK1
CN102 1 RESET 2 DOT CLK2 3 DOT CLK1
7 5 ON SCREEN /BAT 2
CN3 1 BRT LOW 2 BRT CTL 3 BRT HIGH
CN1 1 OS CE 2 PLL/OS DATA 3 PLL/OS CLK 4 UNSW 5V 5 BATT 4.5V 6 GND
7 4 ON SCREEN /BATTRY 1
CN2 1 SWD 5V 2 GND 3 BUZZ 4 NC 5 VIDEO OUT 6 GND 7 VIDEO IN 8 GND
0 1 SWITCHING POWER SUPPLY
CN1 1 -30V 2 +45V 3 GND 4 SEMI REG 7V 5 GND 6 GND 7 SEMI REG 15V 8 GND (M) 9 15V (M)
C
D
CN3 1 -30V 2 +45V 3 GND 4 SEMI REG 7V 5 GND 6 GND 7 SEMI REG 15V 8 GND (M) 9 15V (M)
C
D
CN11 1 SEMI REG 15V 2 GND 3 SEMI REG 7V
CN13 1 SWD 12V 2 SWD 5V 3 GND
CN4 1 UNSW 12V 2 GND
CN6 1 SWD 12V 2 SWD 5V 3 GND 4 -30V 5 GND (IND) 6 -30V (IND) 7 +45V
CN7 1 UNSW 5V 2 UNSW 12V 3 SWD 5V 4 SWD 12V 5 GND
0 2 REGULATOR
CN9 1 SWD 12V 2 SWD 5V 3 GND
CN8 1 GND 2 UNSW 12V 3 SWD 5V 4 POWER ON/OFF 5 MOTOR 12V 6 SWD 12V 7 GND (M) 8 SEMI REG 15V (M)
CN12 1 VS 2 REEL M(-) 3 REEL (-) 4 REEL (+) 5 REEL M(+) 6 VR 7 IN(+) 8 IN(-)
CN10 1 SWD 12V 2 SWD 5V 3 GND
CN5 1 SWD 12V 2 GND
BLU
BRN
LIVE
GND
NEUTRAL
43 42 14
17
7
6
3 47 15 16 8 13 44 12
45
18
24
23
9
18

## 4.4 VIDEO BLOCK DIAGRAM

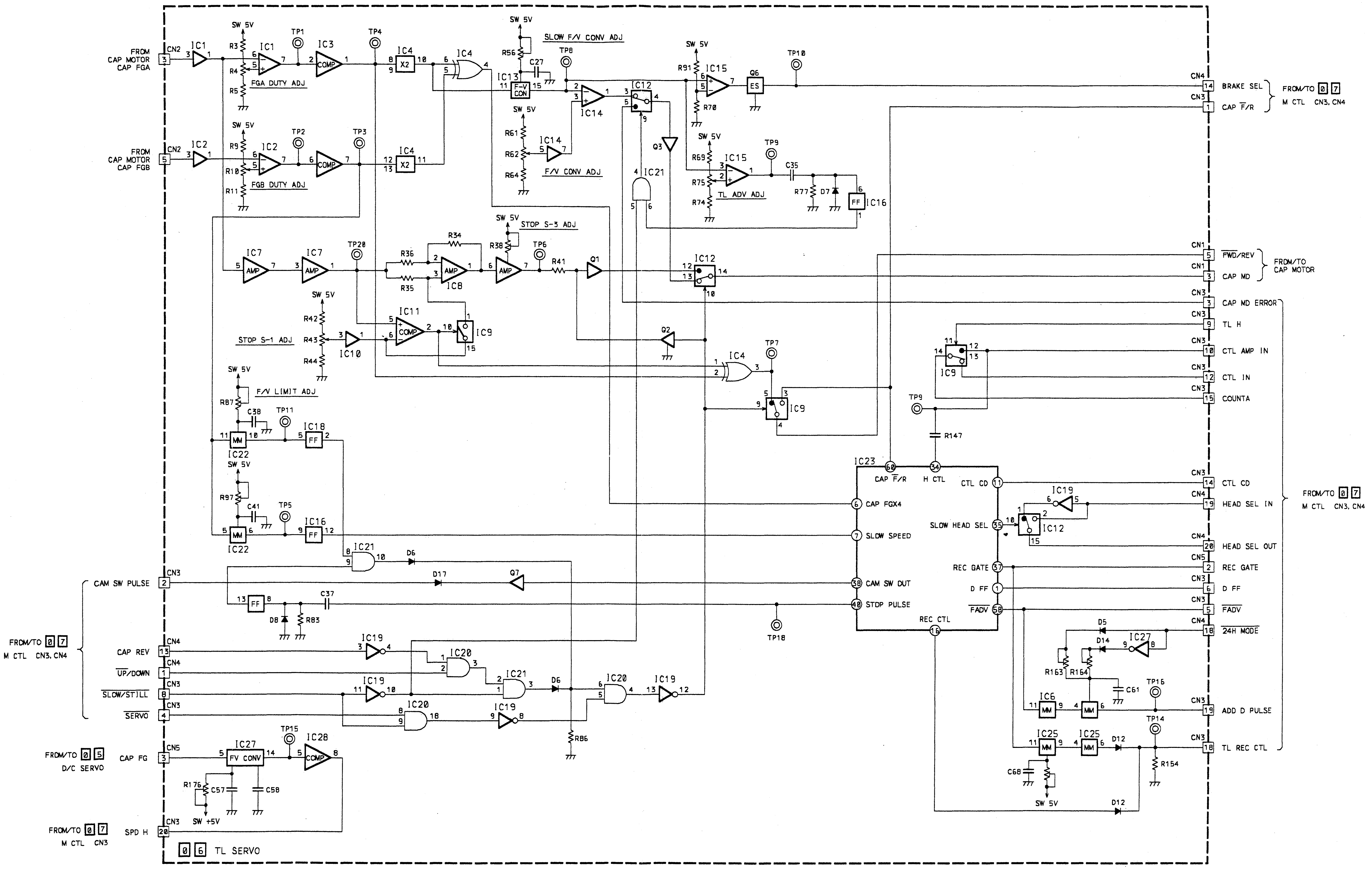

1 0 CN4
FROM VIDEO SUB
HEAD SELECT
CN22
0 5 CN3
FROM/TO DC SERVO
3fsc
CN7
7 7 CN5
FROM/TO DISPLAY
P.SHARPNESS
SHARPNESS MAX
CN9
R208
7 6 CN3
FROM/TO REAR1
VIDEO OUT
VIDEO IN
CN27
TP5
IC1
AGC
5V
R1
AGC LEVEL
7 4 CN2
FROM/TO ONSCREEN
VIDEO IN
VIDEO OUT
CN3
4 3 CN4
FROM/TO PRE REC
ROT
CN5
fsc
3fsc
CF1
IC2
X3 PLL
CLOCK
1H DL
R18
LPF1
NC BALANCE
DE EMPHA
COL/BW
IC3
R59
PB Y LEVEL
LPF3
LPF2
COL
B/W
R67
CARRIER
R69 DEVIATION
EF Q19
Q21
AMP
IC9
R89
EE Y LEVEL
IC4
HPF
ATT
H
L
R43
Q12
EF
TP3
COL/BW
Q25, Q26
PHASE SHIFT
IC17
COLOR INVERT
R106
PB COLOR LEVEL
EP REC COLOR LEVEL
R119
IC12
R121
SP REC COLOR LEVEL
SP
TP19
TP9
EQ1
LPF6
4 3 CN7
FROM/TO PRE/REC
CN4
REC FM
PB FM
4 3 CN6
FROM/TO PRE/REC
CN6
PB COLOR
REC COLOR
0 7 CN1
TO M-CTL
CN8
SYNC
IC5
1H DL
IC6
1H DL
DL1
IC8
Q31
INV
2H DL CTL
IC18
0.25H JUMP CTL
IC14
IC19
0.5H DL
0.5H JUMP CTL
R125
Q34, Q35
AMP
0.25H DELAYED VIDEO LEVEL
IC15
BAL MOD
0.25H
DL2
IC15
BAL MOD
Q39
EF
R140
Q40, Q41
AMP
0.25H DELAYED VIDEO
3fsc
0 4 VIDEO (MAIN)
CN18
CN19
CN20
CN502
IC501
Q502
IC502
EF
AMP
Q501
EF
R502
R501
Q504
Q503
R513
V.PULSE2
R511
V.PULSE1
EE
0 8 MAIN SUB

## 4.5 VIDEO PRE/REC BLOCK DIAGRAM

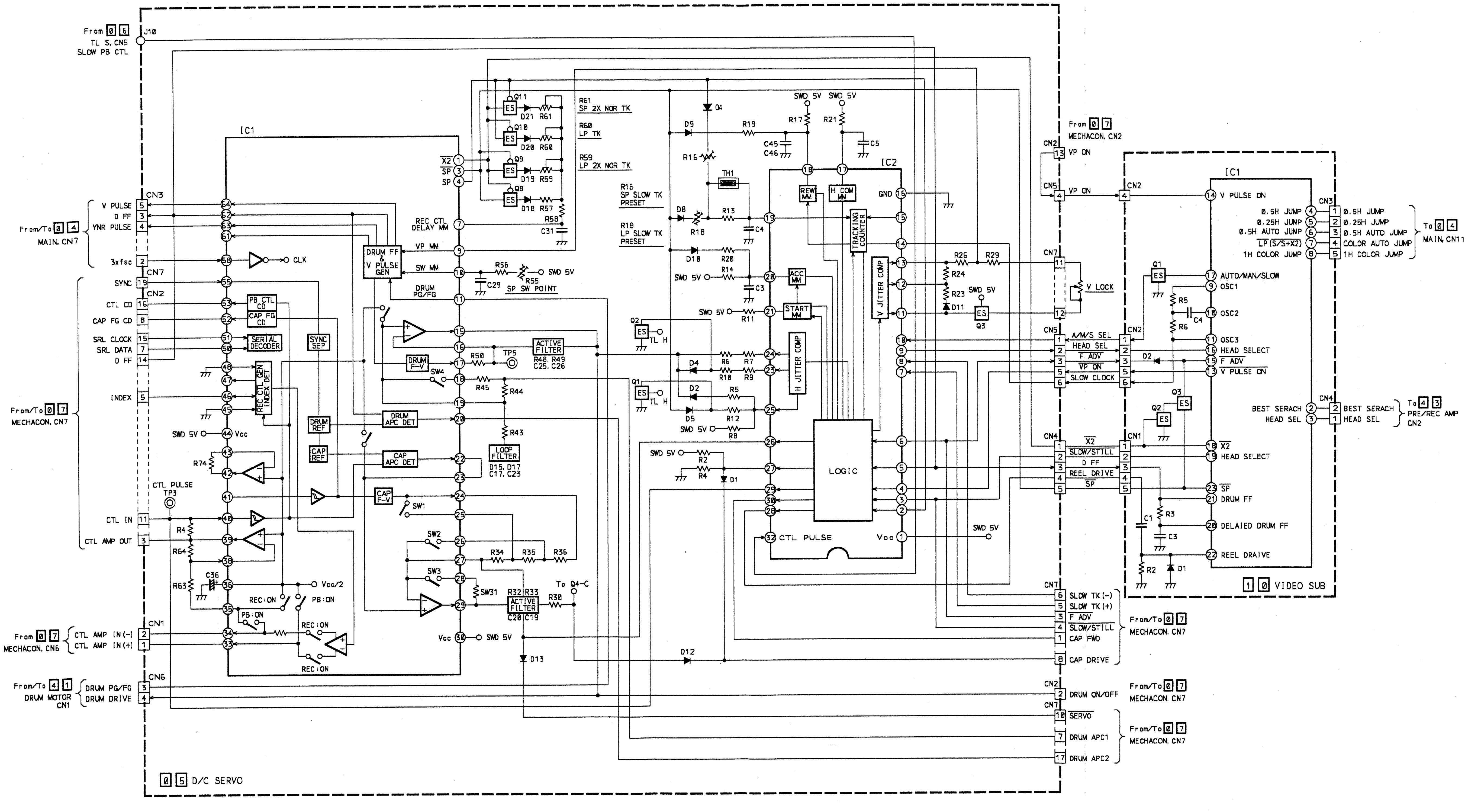

From 04 MAIN CN4
REC FM
CN7
From 04 MAIN CN6
REC COLOR
CN6
L12, C57
FREQ COMP
R50, R51
IC4
OFF
MUTE
ON
EQ
REC
C54, C55
VHS REC EQ
R47 R48
C52
R53
L11
REC START
REC GATE
TL(H)
REC FM CONT
IC5, IC6
R15
SP CH-2 Q
R15
R18
R18
SP CH1-Q
DRUM FF
CH1/2 SEL
TL(H)
LP(H)
IC3
SW CONT
TP7
SWD5V
LP5V
ES
Q15, Q16
Q10
TP6
SWD5V
LP5V
Q13, Q14
Q9
REC 12V
TP1
Q3
R6
C12
REC 12V
Q4
R8
C11
TP5
SWD 5V
SP 5V
LP5V
Q11, Q12
Q8
SWITCHING PULSE CTL
FEEDBACK AMP
SP CH1 AMP
SP CH2 AMP
LP CH1 AMP
LP CH2 AMP
AMP
SW1
SW2
SW3
SW4
INPUT DEC
IC1
R12
R13
TP4
TP3
To 04 MAIN CN6
PB COLOR
SP
LP
DET
COMP
LOGIC
HEAD SELECT
DRUM FF
BEST SEARCH
SYNC
COLOR ROT
COLOR/B/W
R28, 29, 30, C34
B/W ATT
C37, 38, 39, L9, 10
COLOR HPF
AGC
AGC DET
Vcc
SWD 5V
IC2
REC 12V
Q1
R1
C10
REC 12V
TP2
Q2
R3
C9
To 04 MAIN CN4
PB FM
D103
SWD 5V
BUFFER
Q112
Q107, 108, 109, 110
VHS RF EQ
R130
R131
R130
FREQ RESPONSE (N-MODE, SP)
R131
FREQ RESPONSE (N-MODE, LP)
R13
LP CH1 Q
R12
LP CH-2 Q
CN1
42 CONNECTOR
ROTARY TRANSFORMER
41 UPPER DRUM
SP REC/PB HEAD
CH1
SP REC/PB HEAD
CH2
LP REC/PB HEAD
CH1
LP REC/PB HEAD
CH2
43 PRE/REC AMP
A
B
C
E
F
G
H
1
2
3
4
5
6

| MODE | REC | | PB | | STILL | | SEARCH | |
|---|---|---|---|---|---|---|---|---|
| | SP | LP | SP | LP | SP | LP | SP | LP |
| ②PIN | L | L | L | L | M | M | H | H |
| ⑧PIN | H | L | L | H | L | H | L | H |
| SW1 | GND | | OPEN | | OPEN | | OPEN | |
| SW2 | GND | | OPEN | | OPEN | | OPEN | |
| SW3 | | GND | | OPEN | | OPEN | | OPEN |
| SW4 | | GND | | OPEN | | OPEN | | OPEN |

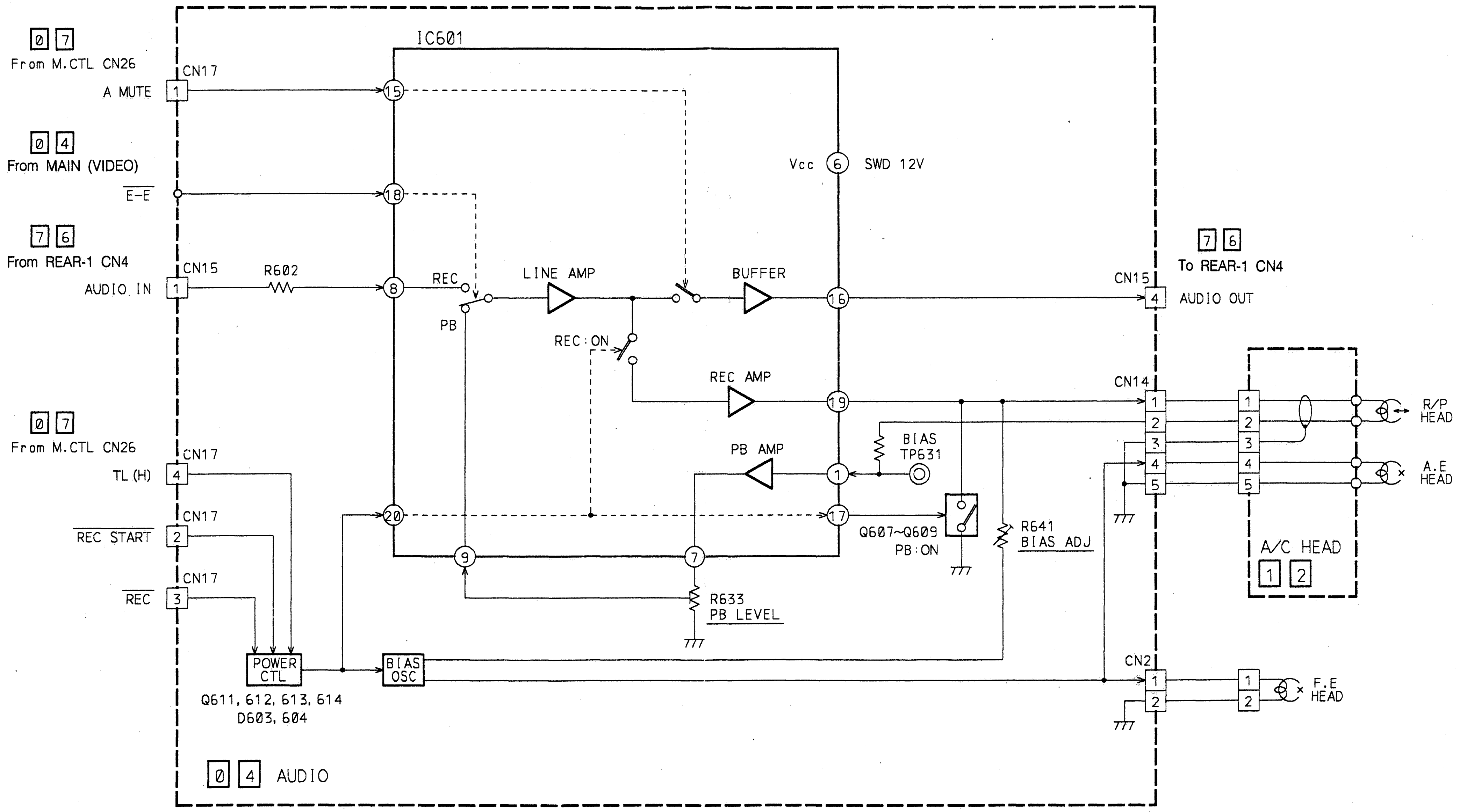
## 4.6 SERVO BLOCK DIAGRAM (1/2)


FROM CAP MOTOR CAP FGA
FROM CAP MOTOR CAP FGB
CN2
IC1
IC2
IC3
IC4
IC5
SW 5V
R3
R4
R5
R9
R10
R11
FGA DUTY ADJ
FGB DUTY ADJ
TP1
TP2
TP3
TP4
COMP
X2
IC13
F-V CON
C27
TP8
R56
SLOW F/V CONV ADJ
R61
R62
R64
IC14
F/V CONV ADJ
IC12
Q3
IC21
R91
IC15
R70
Q6
ES
TP10
R69
R75
R74
TL ADV ADJ
TP9
C35
R77
D7
FF
IC16
IC7
AMP
TP20
R34
R36
R35
IC8
R38
STOP S-3 ADJ
TP6
R41
Q1
R42
R43
R44
STOP S-1 ADJ
IC10
IC11
IC9
Q2
TP7
R87
F/V LIMIT ADJ
C38
TP11
MM
IC22
IC18
R97
C41
TP5
IC16
IC23
CAP F/R
H CTL
CTL CD
CAP FGX4
SLOW SPEED
SLOW HEAD SEL
CAM SW OUT
STOP PULSE
REC GATE
D FF
FADV
REC CTL
R147
D6
D17
Q7
C37
D8
R83
TP18
CAM SW PULSE
CN3
CN4
CN5
CAP REV
UP/DOWN
SLOW/STILL
SERVO
FROM/TO 0 7 M CTL CN3, CN4
IC19
IC20
IC21
D6
R86
FROM/TO 0 5 D/C SERVO
CAP FG
IC27
FV CONV
TP15
IC28
R176
C57
C58
SW +5V
FROM/TO 0 7 M CTL CN3
SPD H
0 6 TL SERVO
CN4 14 BRAKE SEL
CN3 1 CAP F/R
FROM/TO 0 7 M CTL CN3, CN4
CN1 5 FWD/REV
CN1 3 CAP MD
FROM/TO CAP MOTOR
CN3 3 CAP MD ERROR
CN3 9 TL H
CN3 10 CTL AMP IN
CN3 12 CTL IN
CN3 15 COUNTA
CN3 14 CTL CD
CN4 19 HEAD SEL IN
FROM/TO 0 7 M CTL CN3, CN4
CN4 20 HEAD SEL OUT
CN5 2 REC GATE
CN3 6 D FF
CN3 5 FADV
CN4 18 24H MODE
CN3 19 ADD D PULSE
CN3 18 TL REC CTL
D5
D14
R163
R164
C61
TP16
IC6
IC25
D12
TP14
R154
C68
SW 5V

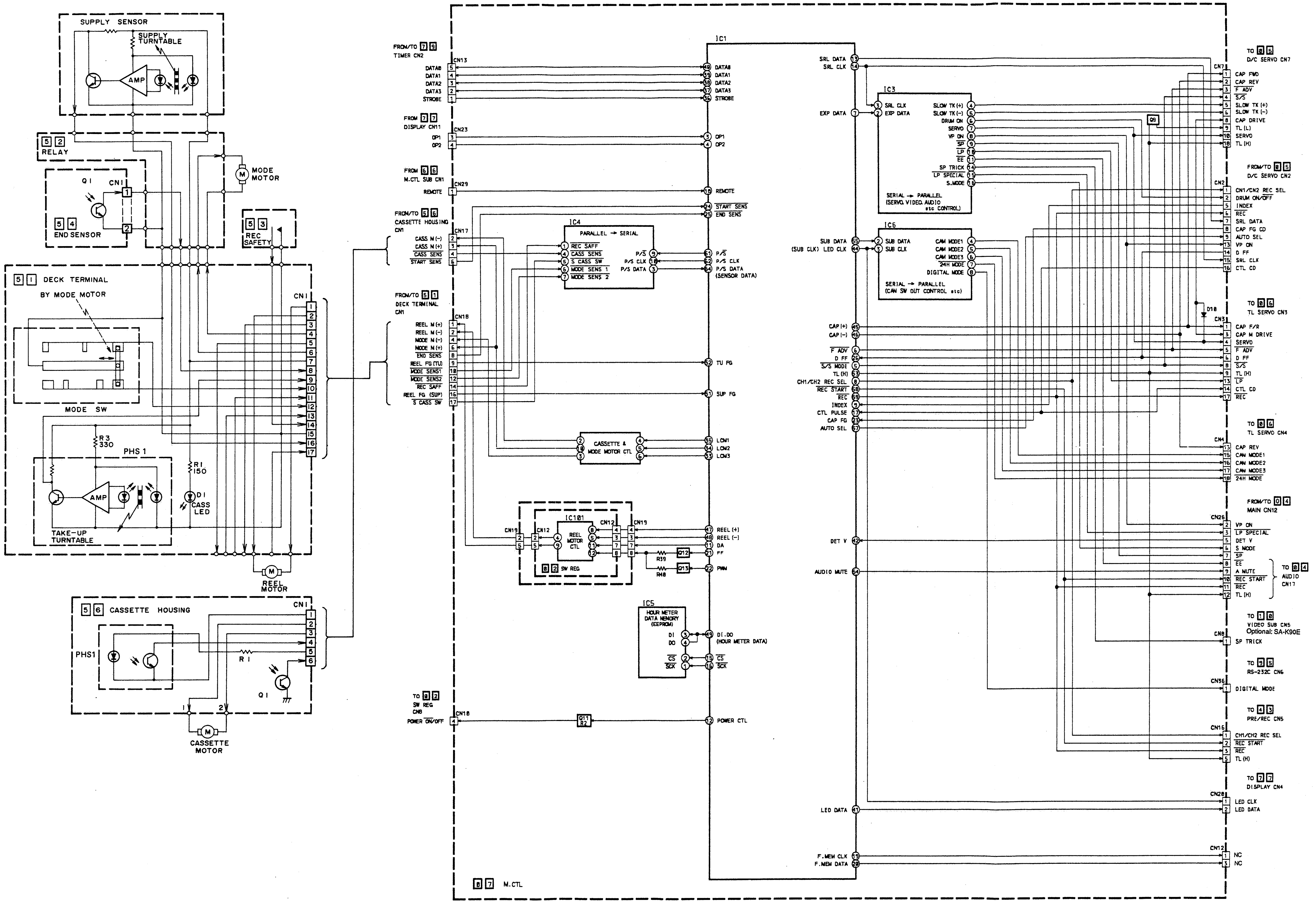
## SERVO BLOCK DIAGRAM (2/2)


From 0 6 TL S. CN5 SLOW PB CTL
J10
IC1
CN3
V PULSE
D FF
YNR PULSE
3xfsc
From/To 0 4 MAIN. CN7
CN7
SYNC
CN2
CTL CD
CAP FG CD
SRL CLOCK
SRL DATA
D FF
INDEX
From/To 0 7 MECHACON. CN7
SWD 5V
Vcc
R74
CTL PULSE TP3
CTL IN
CTL AMP OUT
R4
R64
R63
C36
Vcc/2
REC:ON
PB:ON
CN1
From 0 7 MECHACON. CN6
CTL AMP IN(−)
CTL AMP IN(+)
CN6
From/To 4 1 DRUM MOTOR CN1
DRUM PG/FG
DRUM DRIVE
CLK
PB CTL CD
CAP FG CD
SERIAL DECODER
SYNC SEP
REC CTL GEN INDEX DET
DRUM REF
CAP REF
DRUM FF & V PULSE GEN
DRUM F-V
DRUM APC DET
CAP APC DET
CAP F-V
X2
SP
REC CTL DELAY MM
VP MM
SW MM
DRUM PG/FG
R56
R55
SWD 5V
C29
SP SW POINT
SW4
SW1
SW2
SW3
SW31
R50
TP5
R45
R44
R43
ACTIVE FILTER R48, R49 C25, C26
LOOP FILTER D15, D17 C17, C23
R34
R35
R36
R32 R33 ACTIVE FILTER C20 C19
R30
To Q4-C
Vcc
D13
Q11
Q10
Q9
Q8
ES
D21 R61
D20 R60
D19 R59
D18 R57
R58
C31
R61 SP 2X NOR TK
R60 LP TK
R59 LP 2X NOR TK
R16 SP SLOW TK PRESET
R18 LP SLOW TK PRESET
D9
Q4
R19
R16
TH1
D8
R13
R18
C4
D10
R20
R14
C3
R11
Q2
TL H
Q1
D4
D2
D5
R6
R7
R10
R9
R5
R12
R8
R2
R4
D1
D12
SWD 5V
R17
R21
C45
C46
C5
IC2
REW MM
H COM MM
TRACKING COUNTER
ACC MM
START MM
H JITTER COMP
V JITTER COMP
LOGIC
GND
CTL PULSE
Vcc
R26
R29
R24
R23
D11
Q3
From 0 7 MECHACON. CN2
CN2
VP ON
CN5
CN7
V LOCK
A/M/S SEL
HEAD SEL
F ADV
VP ON
SLOW CLOCK
CN4
X2
SLOW/STILL
D FF
REEL DRIVE
SP
SLOW TK(−)
SLOW TK(+)
CAP FWD
CAP DRIVE
From/To 0 7 MECHACON. CN7
DRUM ON/OFF
SERVO
DRUM APC1
DRUM APC2
0 5 D/C SERVO
V PULSE ON
0.5H JUMP
0.25H JUMP
0.5H AUTO JUMP
LP(S/S+X2)
1H COLOR JUMP
COLOR AUTO JUMP
1H COLOR JUMP
To 0 4 MAIN. CN11
AUTO/MAN/SLOW
OSC1
OSC2
OSC3
HEAD SELECT
F ADV
V PULSE ON
R5
R6
C4
D2
BEST SERACH
HEAD SEL
To 4 3 PRE/REC AMP CN2
HEAD SELECT
SP
DRUM FF
DELAIED DRUM FF
REEL DRAIVE
C1
R3
C3
R2
D1
1 0 VIDEO SUB

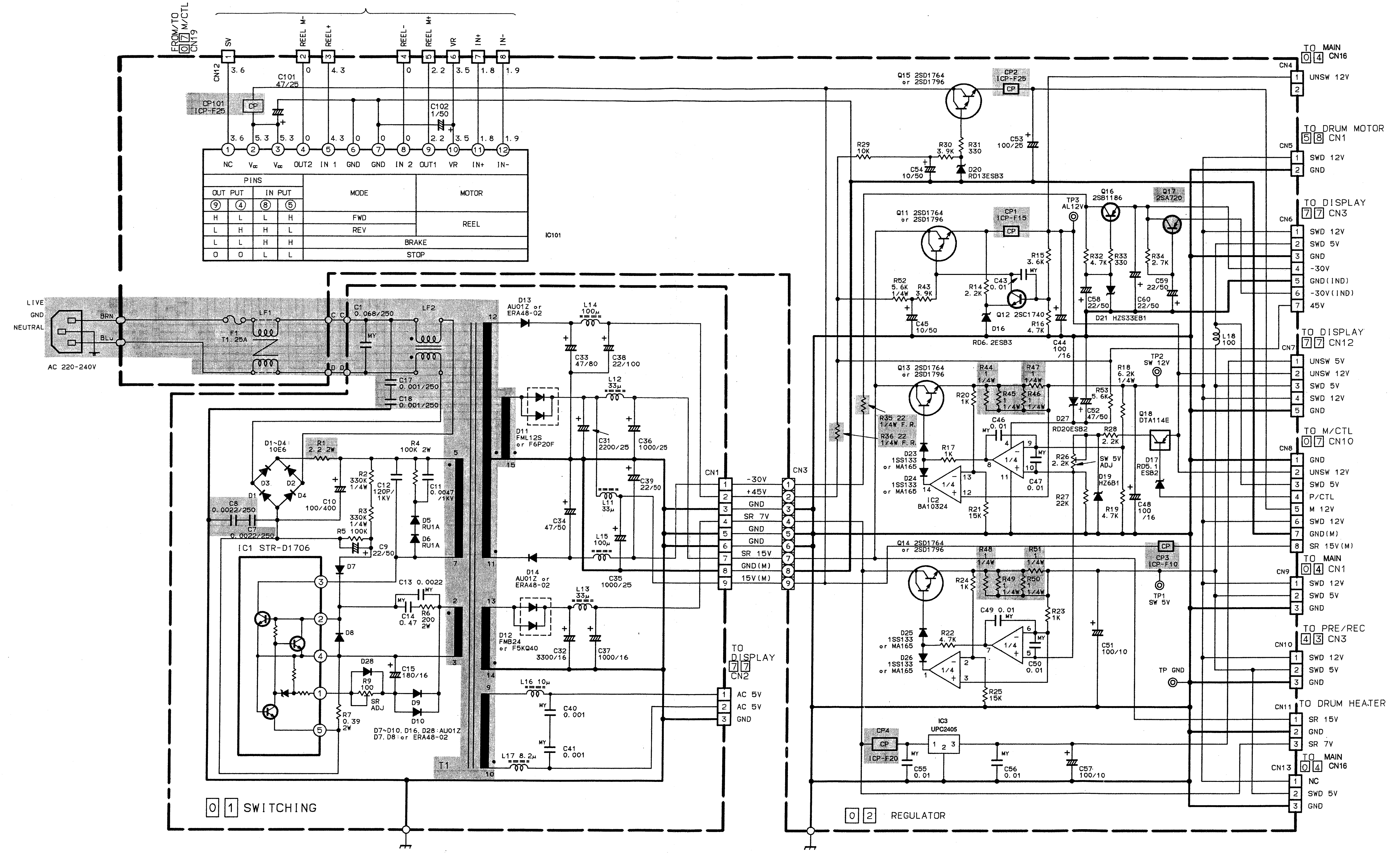
## 4.7 AUDIO BLOCK DIAGRAM


0 7
From M.CTL CN26
CN17
A MUTE
1
0 4
From MAIN (VIDEO)
E-E
7 6
From REAR-1 CN4
CN15
AUDIO IN
R602
0 7
From M.CTL CN26
CN17
TL (H)
4
CN17
REC START
2
CN17
REC
3
IC601
15
18
8
20
9
7
Vcc
6
SWD 12V
REC
PB
LINE AMP
BUFFER
REC:ON
REC AMP
PB AMP
16
19
1
17
BIAS
TP631
Q607~Q609
PB:ON
R641
BIAS ADJ
R633
PB LEVEL
POWER CTL
Q611, 612, 613, 614
D603, 604
BIAS OSC
0 4 AUDIO
7 6
To REAR-1 CN4
CN15
4
AUDIO OUT
CN14
1
2
3
4
5
R/P HEAD
A.E HEAD
A/C HEAD
1 2
CN2
1
2
F.E HEAD

## 4.8 MECHACON BLOCK DIAGRAM


SUPPLY SENSOR
SUPPLY TURNTABLE
AMP
5 2 RELAY
MODE MOTOR
Q1
CN1
5 4 END SENSOR
5 3 REC SAFETY
5 1 DECK TERMINAL
BY MODE MOTOR
MODE SW
R3 330
PHS 1
TAKE-UP TURNTABLE
R1 150
D1 CASS LED
REEL MOTOR
5 6 CASSETTE HOUSING
PHS1
R1
Q1
CASSETTE MOTOR
FROM/TO 7 9 TIMER CN2
CN13
DATA0
DATA1
DATA2
DATA3
STROBE
FROM 7 7 DISPLAY CN11
CN23
OP1
OP2
FROM 6 6 M.CTL SUB CN1
CN29
REMOTE
FROM/TO 5 6 CASSETTE HOUSING CN1
CN17
CASS M(−)
CASS M(+)
CASS SENS
START SENS
FROM/TO 5 1 DECK TERMINAL CN1
CN18
REEL M(+)
REEL M(−)
MODE M(−)
MODE M(+)
END SENS
REEL FG (TU)
MODE SENS1
MODE SENS2
REC SAFF
REEL FG (SUP)
S CASS SW
IC1
START SENS
END SENS
IC4
PARALLEL → SERIAL
REC SAFF
CASS SENS
S CASS SW
MODE SENS 1
MODE SENS 2
P/S
P/S CLK
P/S DATA
P/S DATA (SENSOR DATA)
TU FG
SUP FG
CASSETTE & MODE MOTOR CTL
LCM1
LCM2
LCM3
IC101
REEL MOTOR CTL
CN19
CN12
0 2 SW REG
REEL (+)
REEL (−)
DA
FF
PWM
R39
R40
Q12
Q13
IC5
HOUR METER DATA MEMORY (EEPROM)
DI
DO
CS
SCK
DI.DO (HOUR METER DATA)
TO 0 2 SW REG CN8
CN18
POWER ON/OFF
Q11 R2
POWER CTL
0 7 M.CTL
SRL DATA
SRL CLK
EXP DATA
IC3
SRL CLK
EXP DATA
SLOW TK(+)
SLOW TK(−)
DRUM ON
SERVO
VP ON
SP
LP
EE
SP TRICK
LP SPECIAL
S.MODE
SERIAL → PARALLEL (SERVO, VIDEO, AUDIO etc CONTROL)
SUB DATA
(SUB CLK) LED CLK
IC6
SUB DATA
SUB CLK
CAM MODE1
CAM MODE2
CAM MODE3
24H MODE
DIGITAL MODE
SERIAL → PARALLEL (CAM SW OUT CONTROL etc)
CAP(+)
CAP(−)
F ADV
D FF
S/S MODE
TL(H)
CH1/CH2 REC SEL
REC START
REC
INDEX
CTL PULSE
CAP FG
AUTO SEL
DET V
AUDIO MUTE
LED DATA
F.MEM CLK
F.MEM DATA
Q9
D18
TO 0 5 D/C SERVO CN7
CN7
CAP FWD
CAP REV
F ADV
S/S
SLOW TK (+)
SLOW TK (−)
CAP DRIVE
TL(L)
SERVO
TL(H)
FROM/TO 0 5 D/C SERVO CN2
CN2
CN1/CN2 REC SEL
DRUM ON/OFF
INDEX
REC
SRL DATA
CAP FG CD
AUTO SEL
VP ON
D FF
SRL CLK
CTL CD
TO 0 6 TL SERVO CN3
CN3
CAP F/R
CAP M DRIVE
SERVO
F ADV
D FF
S/S
TL(H)
LP
CTL CD
REC
TO 0 6 TL SERVO CN4
CN4
CAP REV
CAM MODE1
CAM MODE2
CAM MODE3
24H MODE
FROM/TO 0 4 MAIN CN12
CN26
VP ON
LP SPECIAL
DET V
S MODE
SP
EE
A MUTE
REC START
REC
TL(H)
TO 0 4 AUDIO CN17
TO 1 0 VIDEO SUB CN5
Optional: SA-K90E
CN8
SP TRICK
TO 9 5 RS-232C CN6
CN36
DIGITAL MODE
TO 4 3 PRE/REC CN5
CN16
CH1/CH2 REC SEL
REC START
REC
TL(H)
TO 7 7 DISPLAY CN4
CN28
LED CLK
LED DATA
CN12
NC
NC

## 4.9 POWER SUPPLY SCHEMATIC DIAGRAM



FROM/TO 0 7 M/CTL CN19
CN12
SW
REEL M-
REEL+
REEL-
REEL M+
VR
IN+
IN-
CP101 ICP-F25
C101 47/25
C102 1/50
NC
Vcc
OUT2
IN 1
GND
IN 2
OUT1
VR
IN+
IN-
IC101
LIVE
GND
NEUTRAL
BRN
BLU
AC 220-240V
F1 T1.25A
LF1
LF2
C1 0.068/250
C17 0.001/250
C18 0.001/250
C8 0.0022/250
C7 0.0022/250
D1~D4 10E6
R1 2.2 2W
R4 100K 2W
R2 330K 1/4W
R3 330K 1/4W
C12 120P/1KV
C11 0.0047/1KV
C10 100/400
R5 100K
C9 22/50
D5 RU1A
D6 RU1A
D7
D8
IC1 STR-D1706
C13 0.0022
C14 0.47
R6 200 2W
D28
C15 180/16
R9 100
SR ADJ
D9
D10
R7 0.39 2W
D7~D10, D16, D28 : AU01Z
D7, D8 : or ERA48-02
T1
D13 AU01Z or ERA48-02
L14 100μ
C33 47/80
C38 22/100
L12 33μ
D11 FML12S or F6P20F
C31 2200/25
C36 1000/25
C39 22/50
L11 33μ
C34 47/50
L15 100μ
C35 1000/25
D14 AU01Z or ERA48-02
L13 33μ
D12 FMB24 or F5KQ40
C32 3300/16
C37 1000/16
L16 10μ
C40 0.001
L17 8.2μ
C41 0.001
0 1 SWITCHING
CN1
-30V
+45V
GND
SR 7V
GND
GND
SR 15V
GND(M)
15V(M)
CN3
TO DISPLAY 7 7 CN2
AC 5V
AC 5V
GND
Q15 2SD1764 or 2SD1796
CP2 ICP-F25
C53 100/25
R29 10K
R30 3.9K
R31 330
C54 10/50
D20 RD13ESB3
Q11 2SD1764 or 2SD1796
CP1 ICP-F15
R52 5.6K 1/4W
R43 3.9K
C45 10/50
R14 2.2K
C43 0.01
Q12 2SC1740
D16
R15 3.6K
R16 4.7K
RD6.2ESB3
C44 100/16
TP3 AL12V
Q16 2SB1186
Q17 2SA720
R32 4.7K
R33 330
R34 2.7K
C58 22/50
C60 22/50
C59 22/50
D21 HZS33EB1
L18 100
Q13 2SD1764 or 2SD1796
R44 1 1/4W
R45 1 1/4W
R46 1 1/4W
R47 1 1/4W
R20 1K
R35 22 1/4W F.R.
R36 22 1/4W F.R.
D23 1SS133 or MA165
D24 1SS133 or MA165
R17 1K
C46 0.01
IC2 BA10324
R21 15K
D27 RD20ESB2
R53 5.6K
C52 47/50
R18 6.2K 1/4W
TP2 SW 12V
R28 2.2K
R26 2.2K
SW 5V ADJ
D19 HZ6B1
R19 4.7K
C47 0.01
R27 22K
Q18 DTA114E
D17 RD5.1 ESB2
C48 100/16
Q14 2SD1764 or 2SD1796
R48 1 1/4W
R49 1 1/4W
R50 1 1/4W
R51 1 1/4W
R24 1K
C49 0.01
R23 1K
D25 1SS133 or MA165
D26 1SS133 or MA165
R22 4.7K
C50 0.01
R25 15K
C51 100/10
CP3 ICP-F10
TP1 SW 5V
TP GND
CP4 ICP-F20
IC3 UPC2405
C55 0.01
C56 0.01
C57 100/10
0 2 REGULATOR
TO MAIN 0 4 CN16
CN4
UNSW 12V
TO DRUM MOTOR 5 8 CN1
CN5
SWD 12V
GND
TO DISPLAY 7 7 CN3
CN6
SWD 12V
SWD 5V
GND
-30V
GND(IND)
-30V(IND)
45V
TO DISPLAY 7 7 CN12
CN7
UNSW 5V
UNSW 12V
SWD 5V
SWD 12V
GND
TO M/CTL 0 7 CN10
CN8
GND
UNSW 12V
SWD 5V
P/CTL
M 12V
SWD 12V
GND(M)
SR 15V(M)
TO MAIN 0 4 CN1
CN9
SWD 12V
SWD 5V
GND
TO PRE/REC 4 3 CN3
CN10
SWD 12V
SWD 5V
GND
TO DRUM HEATER
CN11
SR 15V
GND
SR 7V
TO MAIN 0 4 CN16
CN13
NC
SWD 5V
GND

| PINS | | | | MODE | MOTOR |
|---|---|---|---|---|---|
| OUT PUT | | IN PUT | | | |
| ⑨ | ④ | ⑧ | ⑤ | | |
| H | L | L | H | FWD | REEL |
| L | H | H | L | REV | |
| L | L | H | H | BRAKE | |
| 0 | 0 | L | L | STOP | |

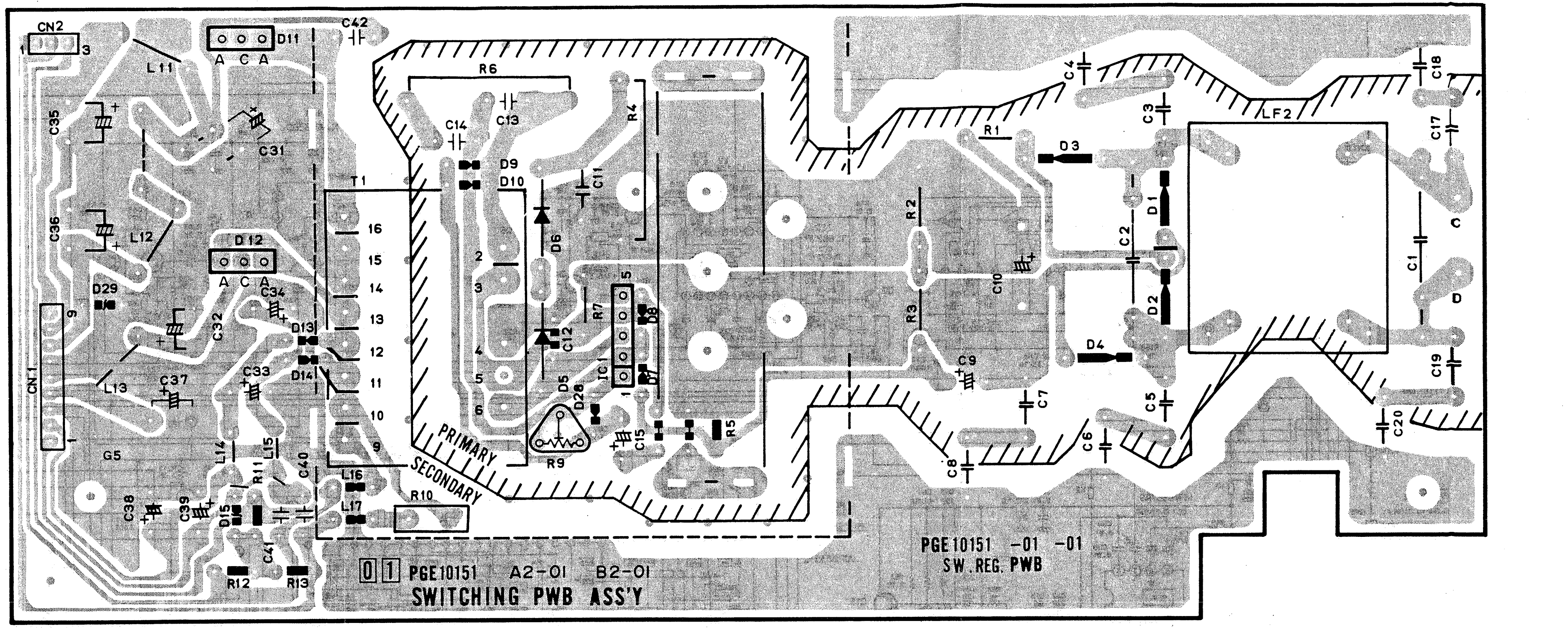
## — SW POWER SUPPLY Voltage —

| Symbol No. | | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC1 | 1 | -136.0 | -136.0 |
| | 2 | -130.7 | -130.7 |
| | 3 | 131.3 | 131.3 |
| | 4 | -131.0 | -131.0 |
| | 5 | -131.0 | -131.0 |
| IC2 | 1 | 18.3 | 18.3 |
| | 2 | 5.3 | 5.3 |
| | 3 | 5.4 | 5.4 |
| | 4 | 5.4 | 5.4 |
| | 5 | 5.4 | 5.4 |
| | 6 | 5.4 | 5.4 |
| | 7 | 8.0 | 8.0 |
| | 8 | 11.4 | 11.4 |
| | 9 | 5.4 | 5.4 |
| | 10 | 5.4 | 5.4 |
| | 11 | 0.0 | 0.0 |
| | 12 | 12.5 | 12.5 |
| | 13 | 11.8 | 11.8 |
| | 14 | 18.2 | 18.2 |
| IC3 | 1 | 8.0 | 8.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 5.0 | 5.0 |
| IC101 | 1 | 3.6 | 3.6 |
| | 2 | 5.3 | 5.3 |
| | 3 | 5.3 | 5.3 |
| | 4 | 0.0 | 0.0 |
| | 5 | 4.3 | 4.3 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| | 8 | 0.0 | 0.0 |
| | 9 | 2.2 | 2.2 |
| | 10 | 3.5 | 3.5 |
| | 11 | 1.8 | 1.8 |
| | 12 | 1.9 | 1.9 |
| **TRANSISTOR** | | | |
| Q11 | B | 13.7 | 13.7 |
| | C | 16.2 | 16.2 |
| | E | 12.3 | 12.3 |
| Q12 | B | 7.0 | 7.0 |
| | C | 13.7 | 13.7 |
| | E | 6.4 | 6.4 |
| Q13 | B | 13.8 | 13.8 |
| | C | 16.1 | 16.1 |
| | E | 12.5 | 12.5 |
| Q14 | B | 6.9 | 6.9 |
| | C | 8.0 | 8.0 |
| | E | 3.4 | 3.4 |
| Q15 | B | 13.5 | 13.5 |
| | C | 16.2 | 16.2 |
| | E | 12.3 | 12.3 |
| Q16 | B | -30.8 | 30.8 |
| | C | -38.0 | 38.0 |
| | E | -30.5 | 30.5 |
| Q17 | B | -30.1 | 30.1 |
| | C | -30.5 | 30.5 |
| | E | -29.9 | 29.9 |
| Q18 | B | 8.3 | 8.3 |
| | C | 12.2 | 12.2 |
| | E | 12.4 | 12.4 |

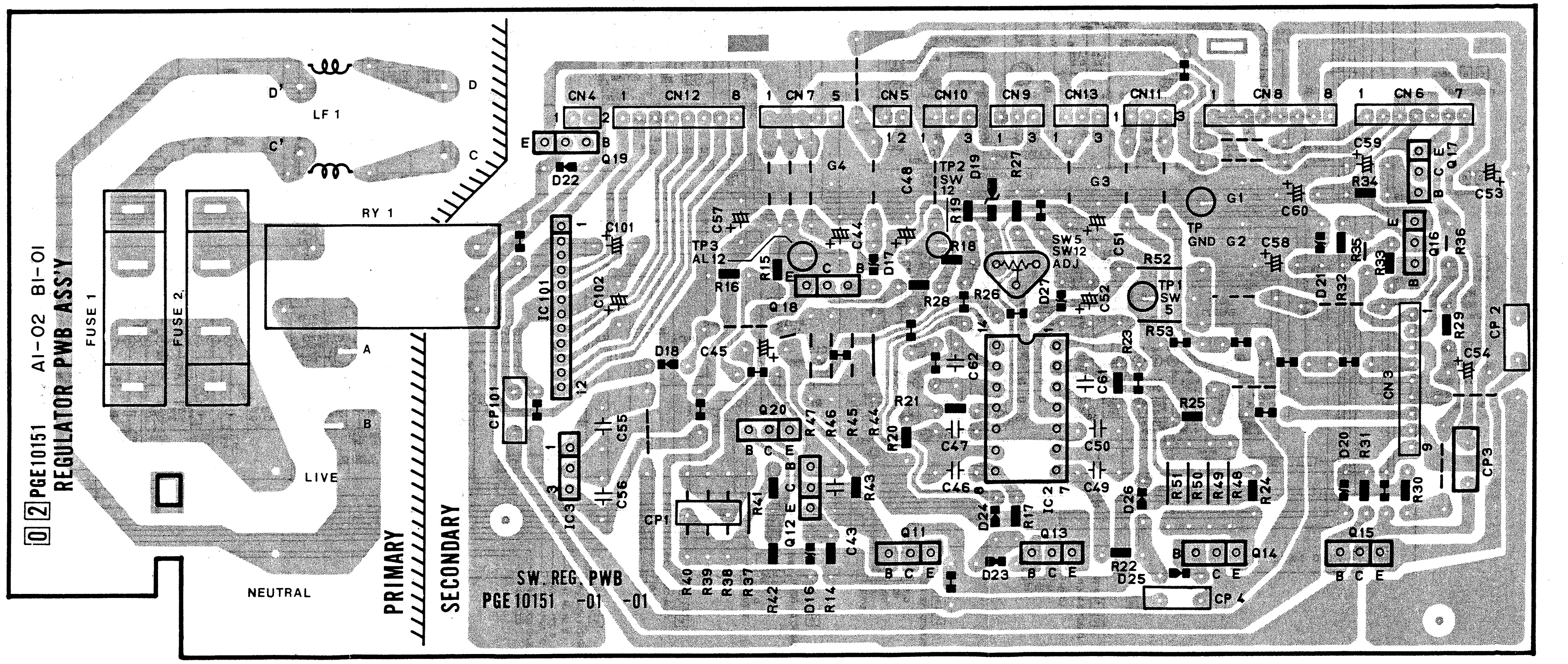
| Symbol No. | | REC | PB |
|---|---|---|---|
| **CONNECTOR** | | | |
| CN1 | 1 | -38.3 | -38.3 |
| | 2 | 45.0 | 45.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 8.0 | 8.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 16.1 | 16.1 |
| | 8 | 0.0 | 0.0 |
| | 9 | 16.2 | 16.2 |
| CN2 | 1 | AC5.0 | AC5.0 |
| | 2 | AC5.0 | AC5.0 |
| | 3 | 0.0 | 0.0 |
| CN5 | 1 | 12.3 | 12.3 |
| | 2 | 0.0 | 0.0 |
| CN6 | 1 | 12.3 | 12.3 |
| | 2 | 5.3 | 5.3 |
| | 3 | 0.0 | 0.0 |
| | 4 | -30.7 | -30.7 |
| | 5 | 0.0 | 0.0 |
| | 6 | -29.9 | -29.9 |
| | 7 | 45.0 | 45.0 |
| CN7 | 1 | 5.0 | 5.0 |
| | 2 | 12.4 | 12.4 |
| | 3 | 5.3 | 5.3 |
| | 4 | 12.3 | 12.3 |
| | 5 | 0.0 | 0.0 |
| CN8 | 1 | 0.0 | 0.0 |
| | 2 | 12.4 | 12.4 |
| | 3 | 5.1 | 5.1 |
| | 4 | 1.2 | 1.2 |
| | 5 | 12.4 | 12.4 |
| | 6 | 12.3 | 12.3 |
| | 7 | 0.0 | 0.0 |
| | 8 | 15.8 | 15.8 |
| CN9 | 1 | 12.3 | 12.3 |
| | 2 | 5.1 | 5.1 |
| | 3 | 0.0 | 0.0 |
| CN10 | 1 | 12.3 | 12.3 |
| | 2 | 5.1 | 5.1 |
| | 3 | 0.0 | 0.0 |
| CN11 | 1 | 16.1 | 16.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 8.0 | 8.0 |
| CN12 | 1 | 3.6 | 3.6 |
| | 2 | 0.0 | 0.0 |
| | 3 | 4.3 | 4.3 |
| | 4 | 0.0 | 0.0 |
| | 5 | 2.2 | 2.2 |
| | 6 | 3.5 | 3.5 |
| | 7 | 1.8 | 1.8 |
| | 8 | 1.9 | 1.9 |
| CN13 | 1 | 12.3 | 12.3 |
| | 2 | 5.1 | 5.1 |
| | 3 | 0.0 | 0.0 |

## 4.10 POWER SUPPLY CIRCUIT BOARD

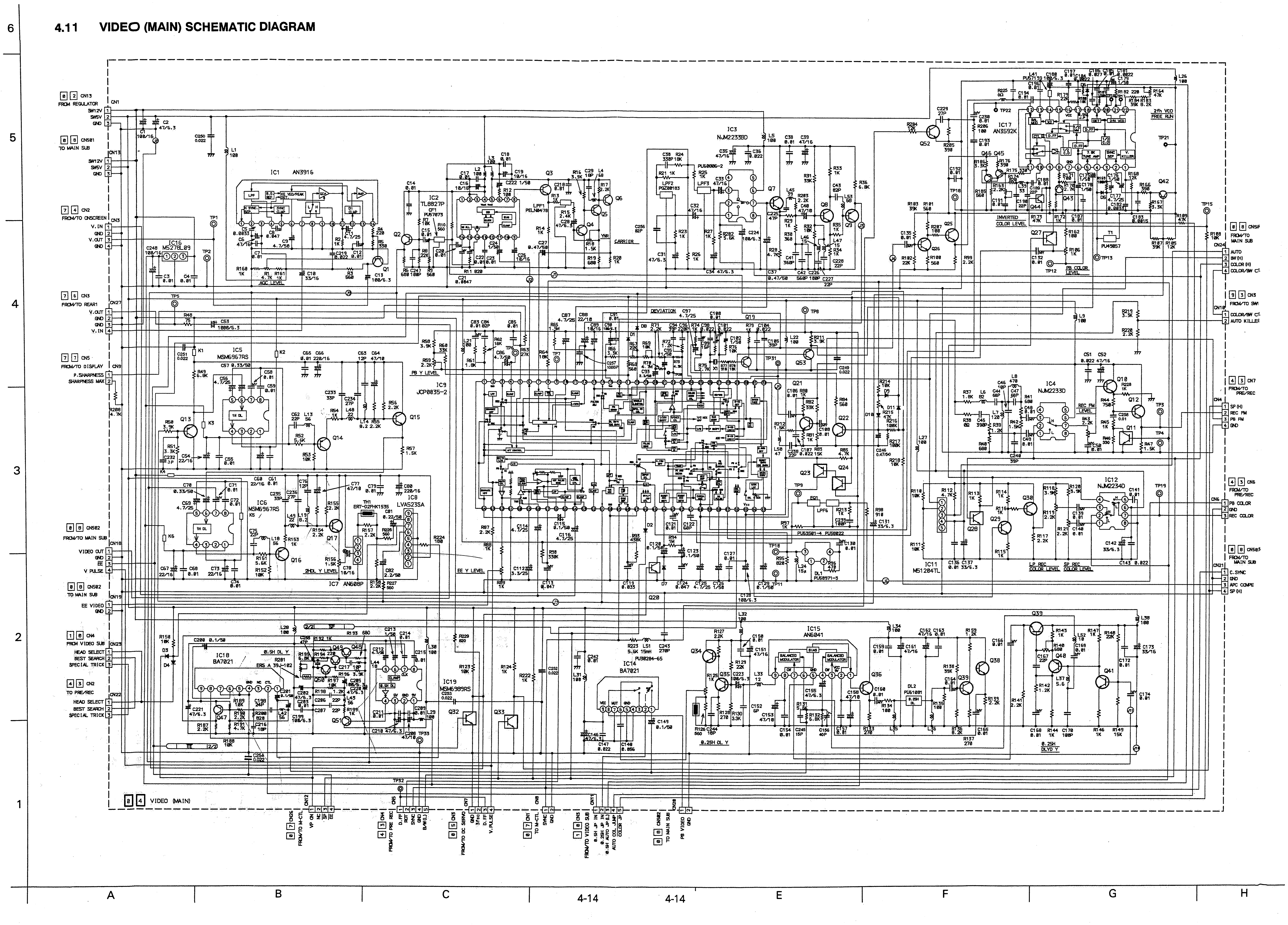
### – SWITCHING –


CN2
D11
C42
L11
R6
C14
C13
R4
C4
C18
C3
C17
LF2
R1
D3
C35
C31
T1
D9
D10
C11
D6
R2
D1
C36
L12
D12
C10
C2
C1
D29
C34
R7
D8
IC1
D2
C32
D13
C12
R3
D4
CN1
C37
C33
D14
D5
D28
C9
C19
L13
C7
C5
C20
PRIMARY
SECONDARY
G5
L14
L15
R11
C40
R9
C15
R5
C8
C6
C38
C39
L16
L17
R10
D15
C41
R12
R13
PGE10151 -01 -01
SW. REG. PWB
01 PGE10151 A2-01 B2-01
SWITCHING PWB ASS'Y

### – REGULATOR –

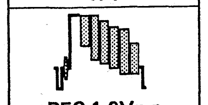

LF1
D
C
RY 1
A
B
FUSE 1
FUSE 2
LIVE
NEUTRAL
PRIMARY
SECONDARY
02 PGE10151 A1-02 B1-01
REGULATOR PWB ASS'Y
SW. REG. PWB
PGE10151 -01 -01
CN4
CN12
CN7
CN5
CN10
CN9
CN13
CN11
CN8
CN6
Q19
D22
C101
C102
IC101
CP101
IC3
C55
C56
CP1
G4
C57
TP3 AL12
R15
R16
Q18
C44
D17
C48
TP2 SW12
D19
R27
R19
R18
R28
R26
SW5 SW12 ADJ
D27
C52
C51
R52
TP1 SW5
G3
G1
TP GND
G2
C58
C59
R34
Q17
C53
C60
R35
R33
Q16
R36
D21
R32
R29
CP2
C54
R53
D18
C45
C62
R23
C61
R25
CN3
Q20
R47
R46
R45
R44
R20
R21
C47
C50
C46
C49
IC2
R41
Q12
R43
C43
Q11
D24
R17
D26
R51
R50
R49
R48
R24
D20
R31
R30
CP3
Q13
Q14
Q15
R22
D25
D23
CP4
R40
R39
R38
R37
R42
D16
R14

## 4.11 VIDEO (MAIN) SCHEMATIC DIAGRAM


0 2 CN13 FROM REGULATOR
SW12V
SW5V
GND
0 8 CN501 TO MAIN SUB
7 4 CN2 FROM/TO ONSCREEN
V.IN
V.OUT
7 6 CN3 FROM/TO REAR1
7 7 CN5 FROM/TO DISPLAY
P.SHARPNESS
SHARPNESS MAX
0 8 CN502 FROM/TO MAIN SUB
VIDEO OUT
EE
V PULSE
0 8 CN502 TO MAIN SUB
EE VIDEO
1 0 CN4 FROM VIDEO SUB
HEAD SELECT
BEST SEARCH
SPECIAL TRICK
4 3 CN2 TO PRE/REC
IC1 AN3916
AGC LEVEL
IC2 TL8827P
IC3 NJM2233BD
CARRIER
IC16 M5276L09
IC5 MSM6967RS
IC6 MSM6967RS
IC7 AN608P
2HDL Y LEVEL
IC8 LVA523SA
IC9 JCP0035-2
PB Y LEVEL
EE Y LEVEL
DEVIATION
IC17 AN3592K
2fh VCO FREE RUN
INVERTED COLOR LEVEL
PB COLOR LEVEL
0 8 CN5 FROM/TO MAIN SUB
AUTO
BW (H)
COLOR (H)
COLOR/BW CTL
9 3 CN3 FROM/TO SW
COLOR/BW CTL
AUTO KILLER
IC4 NJM2233D
REC FM LEVEL
4 3 CN7 FROM/TO PRE/REC
SP (H)
REC FM
PB FM
GND
IC11 M51204TL
IC12 NJM2234D
LP REC COLOR LEVEL
SP REC COLOR LEVEL
4 3 CN6 FROM/TO PRE/REC
PB COLOR
REC COLOR
0 8 CN503 FROM/TO MAIN SUB
C.SYNC
APC COMPE
SP (H)
IC18 BA7021
0.5H DL Y
IC19 MSM6589RS
IC14 BA7021
0.25H DL Y
IC15 AN6041
0.25H DLYD Y
0 4 VIDEO (MAIN)
0 7 CN26 FROM/TO M-CTL
VP ON
4 3 CN4 FROM/TO PRE REC
D.FF
SYNC
0 5 CN3 FROM/TO DC SERVO
D.FF
V.PULSE
0 7 CN1 TO M-CTL
SYNC
1 0 CN3 FROM/TO VIDEO SUB
0.5H JP IN
0.25H JP IN
0.5H AUTO JP
AUTO COL JUMP
COLOR JP
0 8 CN502 TO MAIN SUB
PB VIDEO
A
B
C
D
E
F
G
H
1
2
3
4
5
6

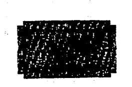
## — MAIN WAVEFORMS OF VIDEO CIRCUIT —

TP1



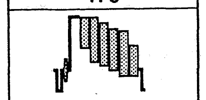
REC 1.2Vp-p

TP3



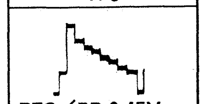
REC 0.14Vp-p

TP5



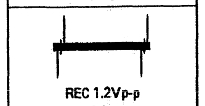
REC/PB 1.0Vp-p

TP6



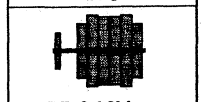
REC/PB 0.45Vp-p

TP7



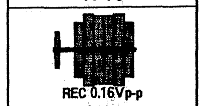
REC 1.2Vp-p
PB 0.9Vp-p

TP9



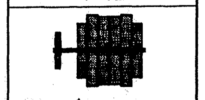
PB 0.16Vp-p

TP10



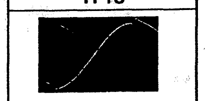
REC 0.16Vp-p
PB 0.11Vp-p

TP12



REC/PB 1.0Vp-p

TP13

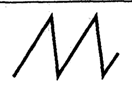


PB 1.08Vp-p

TP15

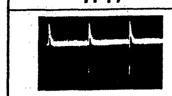
DC 3.8V

TP16



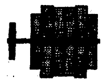
PB 2.6Vp-p

TP17



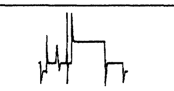
PB 0.25Vp-p

TP19



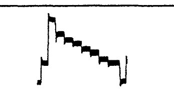
REC 50mVp-p

TP20



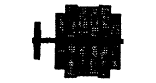
REC 1.1Vp-p (pulse & bar)

TP20



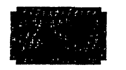
PB 0.4Vp-p

TP22



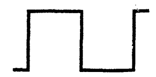
REC/PB 0.6Vp-p

TP31



PB 1.0Vp-p

TP32

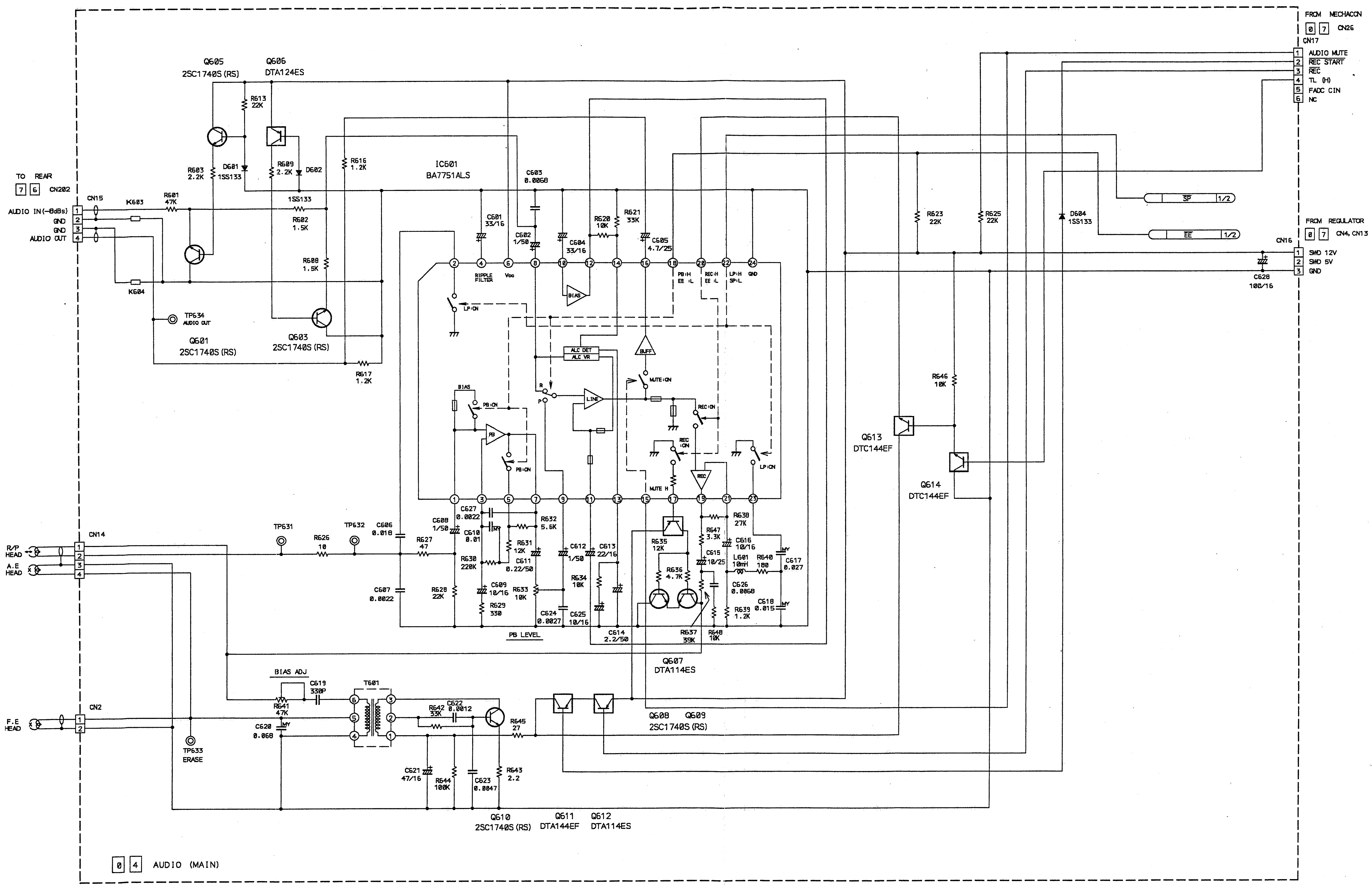


REC/PB 5.0Vp-p

## — VIDEO(MAIN) Voltage —

| Symbol No. | | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC1 | 1 | NC | NC |
| | 2 | 3.0 | 3.0 |
| | 3 | 5.2 | 5.2 |
| | 4 | 2.0 | 2.0 |
| | 5 | 1.7 | 1.7 |
| | 6 | 2.2 | 2.2 |
| | 7 | 2.9 | 3.0 |
| | 8 | 0.0 | 0.0 |
| | 9 | 0.0 | 0.0 |
| | 10 | 0.0 | 0.0 |
| | 11 | 2.7 | 2.7 |
| | 12 | 3.2 | 3.2 |
| | 13 | 2.8 | 2.8 |
| | 14 | 2.3 | 2.3 |
| IC2 | 1 | NC | NC |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 5.2 | 5.2 |
| | 5 | 5.2 | 5.2 |
| | 6 | 10.6 | 10.6 |
| | 7 | NC | 0.0 |
| | 8 | 3.4 | 3.3 |
| | 9 | 1.6 | 1.6 |
| | 10 | NC | NC |
| | 11 | 2.7 | 2.7 |
| | 12 | NC | NC |
| | 13 | 2.7 | 2.7 |
| | 14 | 0.7 | 0.7 |
| | 15 | 2.0 | 2.0 |
| | 16 | 2.6 | 2.6 |
| IC3 | 1 | 7.7 | 7.7 |
| | 2 | 3.7 | 3.7 |
| | 3 | 7.6 | 7.6 |
| | 4 | NC | NC |
| | 5 | NC | NC |
| | 6 | 12.3 | 0.0 |
| | 7 | 6.7 | 6.7 |
| | 8 | 0.0 | 0.0 |
| IC4 | 1 | 3.2 | 3.2 |
| | 2 | 4.6 | 4.6 |
| | 3 | 3.1 | 3.2 |
| | 4 | NC | NC |
| | 5 | NC | NC |
| | 6 | 5.3 | 5.3 |
| | 7 | 2.4 | 2.4 |
| | 8 | 0.0 | 0.0 |
| IC5 | 1 | 8.8 | 8.8 |
| | 2 | 0.0 | 0.0 |
| | 3 | 5.3 | 5.3 |
| | 4 | 3.2 | 3.2 |
| | 5 | 3.0 | 3.1 |
| | 6 | 1.9 | 2.1 |
| | 7 | 1.5 | 1.5 |
| | 8 | 4.5 | 4.5 |
| IC6 | 1 | 8.8 | 8.8 |
| | 2 | NC | NC |
| | 3 | 5.3 | 5.3 |
| | 4 | 3.2 | 3.2 |
| | 5 | 3.0 | 3.1 |
| | 6 | 2.0 | 2.1 |
| | 7 | 1.5 | 1.5 |
| | 8 | 4.5 | 4.5 |
| IC7 | 1 | 7.2 | 7.3 |
| | 2 | 12.4 | 12.4 |
| | 3 | 2.8 | 2.8 |
| | 4 | 0.0 | 0.0 |
| IC8 | 1 | NC | NC |
| | 2 | 12.4 | 12.4 |
| | 3 | NC | NC |
| | 4 | 3.9 | 4.2 |
| | 5 | 0.0 | 0.0 |
| | 6 | 4.5 | 4.9 |
| | 7 | 0.5 | 0.5 |
| | 8 | 4.6 | 4.9 |
| | 9 | 0.0 | 0.0 |
| IC9 | 1 | 1.8 | 1.7 |
| | 2 | 0.0 | 0.0 |
| | 3 | 2.8 | 1.9 |
| | 4 | 3.2 | 3.2 |
| | 5 | 3.2 | 3.2 |
| | 6 | 2.2 | 2.1 |
| | 7 | 3.7 | 3.7 |
| | 8 | 2.6 | 2.6 |
| | 9 | 3.4 | 3.2 |
| | 10 | 3.4 | 3.2 |
| | 11 | 3.6 | 1.2 |
| | 12 | 2.5 | 3.2 |
| | 13 | 2.5 | 2.5 |
| | 14 | 1.6 | 2.4 |
| | 15 | 5.1 | 5.0 |
| | 16 | 2.2 | 2.5 |
| | 17 | 0.7 | 3.5 |
| | 18 | 2.3 | 3.5 |
| | 19 | 3.3 | 3.3 |
| | 20 | 2.5 | 2.5 |
| | 21 | 3.6 | 3.5 |
| | 22 | 2.5 | 2.7 |
| | 23 | 2.5 | 2.7 |
| | 24 | 0.0 | 0.0 |
| | 25 | 2.6 | 2.5 |
| | 26 | 3.7 | 3.7 |
| | 27 | 2.6 | 2.5 |
| | 28 | 2.7 | 3.4 |
| | 29 | 3.0 | 3.0 |
| | 30 | NC | NC |
| | 31 | 1.6 | 1.6 |
| | 32 | 3.4 | 3.4 |
| | 33 | 1.7 | 1.7 |
| | 34 | 2.3 | 2.3 |
| | 35 | 5.1 | 5.1 |
| | 36 | 2.6 | 2.0 |
| | 37 | 2.5 | 2.5 |
| | 38 | 3.0 | 3.0 |
| | 39 | 2.9 | 2.9 |
| | 40 | 4.3 | 5.1 |
| | 41 | 2.1 | 2.1 |
| | 42 | 3.5 | 3.2 |
| | 43 | 2.5 | 2.5 |
| | 44 | 3.5 | 3.2 |
| | 45 | 3.1 | 3.0 |
| | 46 | 0.7 | 0.7 |
| | 47 | 0.0 | 0.0 |
| | 48 | 3.3 | 3.2 |
| | 49 | 0.5 | 0.5 |
| | 50 | 0.0 | 0.0 |
| | 51 | 1.1 | 2.0 |
| | 52 | NC | NC |
| | 53 | NC | NC |
| | 54 | 2.9 | 3.0 |
| | 55 | 1.9 | 1.2 |
| IC9 | 56 | NC | NC |
| | 57 | 3.8 | 2.1 |
| | 58 | 2.0 | 2.0 |
| | 59 | 2.7 | 1.6 |
| | 60 | NC | NC |
| | 61 | 0.0 | 0.0 |
| | 62 | 2.3 | 0.7 |
| | 63 | 0.7 | 0.8 |
| | 64 | 0.0 | 0.0 |
| IC11 | 1 | 1.6 | 1.6 |
| | 2 | 2.6 | 2.6 |
| | 3 | 5.2 | 5.2 |
| | 4 | 5.3 | 5.3 |
| | 5 | 0.0 | 0.0 |
| IC12 | 1 | 3.1 | 3.1 |
| | 2 | 0.2 | 0.2 |
| | 3 | 3.2 | 3.2 |
| | 4 | 0.1 | 0.1 |
| | 5 | 3.2 | 3.2 |
| | 6 | 5.3 | 5.3 |
| | 7 | 2.4 | 2.4 |
| | 8 | 0.0 | 0.0 |
| IC14 | 1 | 2.4 | 2.8 |
| | 2 | 5.0 | 5.0 |
| | 3 | NC | NC |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 2.4 | 2.7 |
| | 7 | 0.0 | 0.0 |
| | 8 | 1.1 | 1.4 |
| | 9 | 5.3 | 5.3 |
| IC15 | 1 | 6.2 | 6.2 |
| | 2 | 8.8 | 8.8 |
| | 3 | 2.3 | 2.3 |
| | 4 | 6.0 | 6.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 6.0 | 6.0 |
| | 7 | 2.3 | 2.3 |
| | 8 | 6.0 | 6.0 |
| | 9 | 6.2 | 6.2 |
| IC16 | 1 | 8.8 | 8.8 |
| | 2 | 0.0 | 0.0 |
| | 3 | 12.4 | 12.4 |
| IC17 | 1 | 0.1 | 2.2 |
| | 2 | 2.8 | 3.1 |
| | 3 | 3.4 | 3.6 |
| | 4 | 5.2 | 5.2 |
| | 5 | 3.3 | 3.3 |
| | 6 | 2.6 | 2.6 |
| | 7 | 0.0 | 0.0 |
| | 8 | 2.9 | 2.9 |
| | 9 | 0.0 | 0.0 |
| | 10 | 3.4 | 3.4 |
| | 11 | 3.9 | 3.9 |
| | 12 | 3.4 | 3.4 |
| | 13 | 3.4 | 3.4 |
| | 14 | 5.3 | 5.3 |
| | 15 | 5.3 | 5.3 |
| | 16 | 5.3 | 5.3 |
| | 17 | 0.1 | 1.2 |
| | 18 | 0.1 | 0.1 |
| | 19 | 1.6 | 2.6 |
| | 20 | 2.6 | 2.6 |
| | 21 | — | 2.6 |
| IC17 | 22 | 0.8 | 0.8 |
| IC18 | 1 | 2.4 | 2.7 |
| | 2 | 5.0 | 5.0 |
| | 3 | NC | NC |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 2.4 | 2.7 |
| | 7 | 0.0 | 0.0 |
| | 8 | 1.1 | 1.4 |
| | 9 | 5.3 | 5.3 |
| IC19 | 1 | 8.7 | 8.7 |
| | 2 | 0.0 | 0.0 |
| | 3 | 5.3 | 5.3 |
| | 4 | 3.2 | 3.2 |
| | 5 | 3.1 | 3.2 |
| | 6 | 1.9 | 2.1 |
| | 7 | 1.5 | 1.5 |
| | 8 | 4.5 | 4.5 |
| **TRANSISTOR** | | | |
| Q1 | B | 1.4 | 1.4 |
| | C | 0.0 | 0.0 |
| | E | 2.0 | 2.0 |
| Q2 | B | 3.4 | 3.4 |
| | C | 5.2 | 5.2 |
| | E | 2.8 | 2.8 |
| Q3 | B | 3.4 | 3.3 |
| | C | 5.2 | 5.2 |
| | E | 1.6 | 2.7 |
| Q4 | B | 0.6 | 0.6 |
| | C | 1.3 | 1.3 |
| | E | 0.0 | 0.0 |
| Q5 | B | 1.3 | 1.3 |
| | C | 3.1 | 3.1 |
| | E | 0.6 | 0.6 |
| Q6 | B | 3.1 | 3.1 |
| | C | 5.2 | 5.2 |
| | E | 2.6 | 2.5 |
| Q7 | B | 6.9 | 6.9 |
| | C | 12.3 | 12.3 |
| | E | 6.2 | 6.2 |
| Q8 | B | 2.8 | 2.8 |
| | C | 10.2 | 10.2 |
| | E | 2.1 | 2.1 |
| Q9 | B | 2.1 | 2.1 |
| | C | 0.0 | 0.0 |
| | E | 2.8 | 2.8 |
| Q10 | B | 2.4 | 2.4 |
| | C | 5.3 | 5.3 |
| | E | 1.8 | 1.7 |
| Q11 | B | 0.2 | 0.2 |
| | C | 0.6 | 0.6 |
| | E | 0.0 | 0.0 |
| Q12 | B | 1.2 | 1.3 |
| | C | 5.3 | 5.3 |
| | E | 0.7 | 0.6 |
| Q13 | B | 0.5 | 0.9 |
| | C | 0.0 | 0.0 |
| | E | 1.2 | 1.5 |
| Q14 | B | 2.1 | 2.1 |
| | C | 0.0 | 0.0 |
| | E | 2.6 | 2.6 |
| Q15 | B | 5.7 | 5.7 |
| | C | 12.4 | 12.4 |
| | E | 5.1 | 5.1 |
| Q16 | B | 2.1 | 2.1 |
| | C | 0.0 | 0.0 |
| | E | 2.6 | 2.6 |
| Q17 | B | 5.7 | 5.7 |
| | C | 12.4 | 12.4 |
| | E | 5.1 | 5.1 |
| Q19 | B | 2.7 | 3.3 |
| | C | 5.1 | 5.1 |
| | E | 2.2 | 2.9 |
| Q20 | B | 3.9 | 4.1 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q21 | B | 1.6 | 1.6 |
| | C | 4.3 | 4.3 |
| | E | 1.0 | 1.0 |
| Q22 | B | 0.3 | 0.6 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q23 | B | 5.1 | 0.0 |
| | C | 4.3 | 5.1 |
| | E | 5.1 | 5.1 |
| Q24 | B | 0.1 | 5.2 |
| | C | 5.1 | 0.0 |
| | E | 0.0 | 0.0 |
| Q25 | B | 4.2 | 4.2 |
| | C | 5.3 | 5.3 |
| | E | 3.5 | 3.6 |
| Q26 | B | 1.7 | 1.7 |
| | C | 4.2 | 4.2 |
| | E | 1.1 | 1.1 |
| Q27 | B | 0.1 | 0.1 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q28 | B | 4.6 | 4.6 |
| | C | 0.1 | 0.1 |
| | E | 0.0 | 0.0 |
| Q29 | B | 2.3 | 2.3 |
| | C | 3.6 | 3.6 |
| | E | 1.7 | 1.7 |
| Q30 | B | 3.6 | 3.6 |
| | C | 5.3 | 5.3 |
| | E | 3.0 | 2.9 |
| Q32 | B | 0.0 | 0.0 |
| | C | 3.9 | 4.1 |
| | E | 0.0 | 0.0 |
| Q33 | B | 0.2 | 0.2 |
| | C | 4.8 | 5.1 |
| | E | 0.0 | 0.0 |
| Q34 | B | 5.0 | 5.0 |
| | C | 12.3 | 12.3 |
| | E | 4.4 | 4.4 |
| Q35 | B | 1.6 | 1.6 |
| | C | 5.0 | 5.0 |
| | E | 0.9 | 0.9 |
| Q36 | B | 6.2 | 6.2 |
| | C | 12.3 | 12.3 |
| | E | 5.5 | 5.5 |
| Q37 | B | 2.0 | 2.0 |
| | C | 6.7 | 6.7 |
| | E | 1.3 | 1.3 |
| Q38 | B | 6.7 | 6.6 |
| | C | 12.3 | 12.3 |
| | E | 6.0 | 6.0 |
| Q39 | B | 4.5 | 4.5 |
| | C | 5.3 | 5.3 |
| | E | 3.8 | 3.8 |
| Q40 | B | 3.9 | 3.9 |
| | C | 0.8 | 0.8 |
| | E | 4.5 | 4.5 |
| Q41 | B | 2.1 | 2.1 |
| | C | 3.9 | 3.9 |
| | E | 1.5 | 1.5 |
| Q42 | B | 4.0 | 4.0 |
| | C | 5.3 | 5.3 |
| | E | 3.3 | 3.4 |
| Q43 | B | 2.7 | 2.7 |
| | C | 5.3 | 5.3 |
| | E | 2.1 | 2.1 |
| Q44 | B | 3.7 | 3.7 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q45 | B | 3.8 | 3.8 |
| | C | 1.2 | 1.2 |
| | E | 4.4 | 4.4 |
| Q46 | B | 1.2 | 1.2 |
| | C | 0.0 | 0.0 |
| | E | 1.8 | 1.8 |
| Q47 | B | 2.6 | 2.6 |
| | C | 5.3 | 5.3 |
| | E | 2.0 | 2.0 |
| Q48 | B | 3.2 | 3.2 |
| | C | 5.3 | 5.3 |
| | E | 2.5 | 2.6 |
| Q49 | B | 1.3 | 1.3 |
| | C | 3.2 | 3.2 |
| | E | 0.7 | 0.7 |
| Q50 | B | 0.6 | 0.6 |
| | C | 1.3 | 1.3 |
| | E | 0.0 | 0.0 |
| Q51 | B | 3.2 | 3.2 |
| | C | 5.3 | 5.3 |
| | E | 2.6 | 2.7 |
| Q52 | B | 0.2 | 0.2 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q53 | B | 3.0 | 3.0 |
| | C | 5.1 | 5.1 |
| | E | 2.4 | 2.4 |
| **CONNECTOR** | | | |
| CN1 | 1 | 12.4 | 12.4 |
| | 2 | 5.3 | 5.3 |
| | 3 | 0.0 | 0.0 |
| CN3 | 1 | 1.3 | 1.3 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.4 | 1.6 |
| | 4 | 0.0 | 0.0 |
| CN4 | 1 | 4.8 | 5.1 |
| | 2 | 0.6 | 0.6 |
| | 3 | 1.1 | 1.2 |
| | 4 | 0.0 | 0.0 |
| CN5 | 1 | 2.5 | 2.1 |
| | 2 | 2.2 | 2.0 |
| | 3 | 0.5 | 0.5 |
| | 4 | 0.0 | 0.0 |
| | 5 | 4.6 | 4.6 |
| CN6 | 1 | 3.6 | 2.3 |
| | 2 | 0.0 | 0.0 |
| | 3 | 2.4 | 2.4 |
| CN7 | 1 | 0.0 | 0.0 |
| | 2 | 2.6 | 2.8 |
| | 3 | 2.7 | 2.9 |
| | 4 | 0.1 | 0.2 |
| CN8 | 1 | 0.5 | 0.5 |
| | 2 | 0.0 | 0.0 |
| CN9 | 1 | 3.2 | 3.2 |
| | 2 | 1.6 | 1.6 |
| CN10 | 1 | 2.0 | 2.0 |
| | 2 | 2.0 | 2.0 |
| CN11 | 1 | 5.0 | 5.0 |
| | 2 | 5.0 | 5.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 5.0 | 5.0 |
| CN12 | 1 | 0.0 | 0.0 |
| | 2 | NC | NC |
| | 3 | 0.2 | 0.2 |
| | 4 | 0.1 | 5.1 |
| CN13 | 1 | 12.4 | 12.4 |
| | 2 | 5.3 | 5.3 |
| | 3 | 0.0 | 0.0 |
| CN18 | 1 | 7.6 | 7.8 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.1 | 5.1 |
| | 4 | 0.1 | 0.2 |
| CN19 | 1 | 0.6 | 0.2 |
| | 2 | 0.0 | 0.0 |
| CN20 | 1 | 1.0 | 1.4 |
| | 2 | 0.0 | 0.0 |
| CN21 | 1 | 0.5 | 0.5 |
| | 2 | 0.0 | 0.0 |
| | 3 | 4.5 | 4.6 |
| | 4 | 4.8 | 5.1 |
| CN22 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| CN23 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| CN24 | 1 | 5.2 | 5.2 |
| | 2 | 1.6 | 1.6 |
| | 3 | 4.6 | 4.6 |
| | 4 | 2.0 | 2.0 |
| CN27 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |

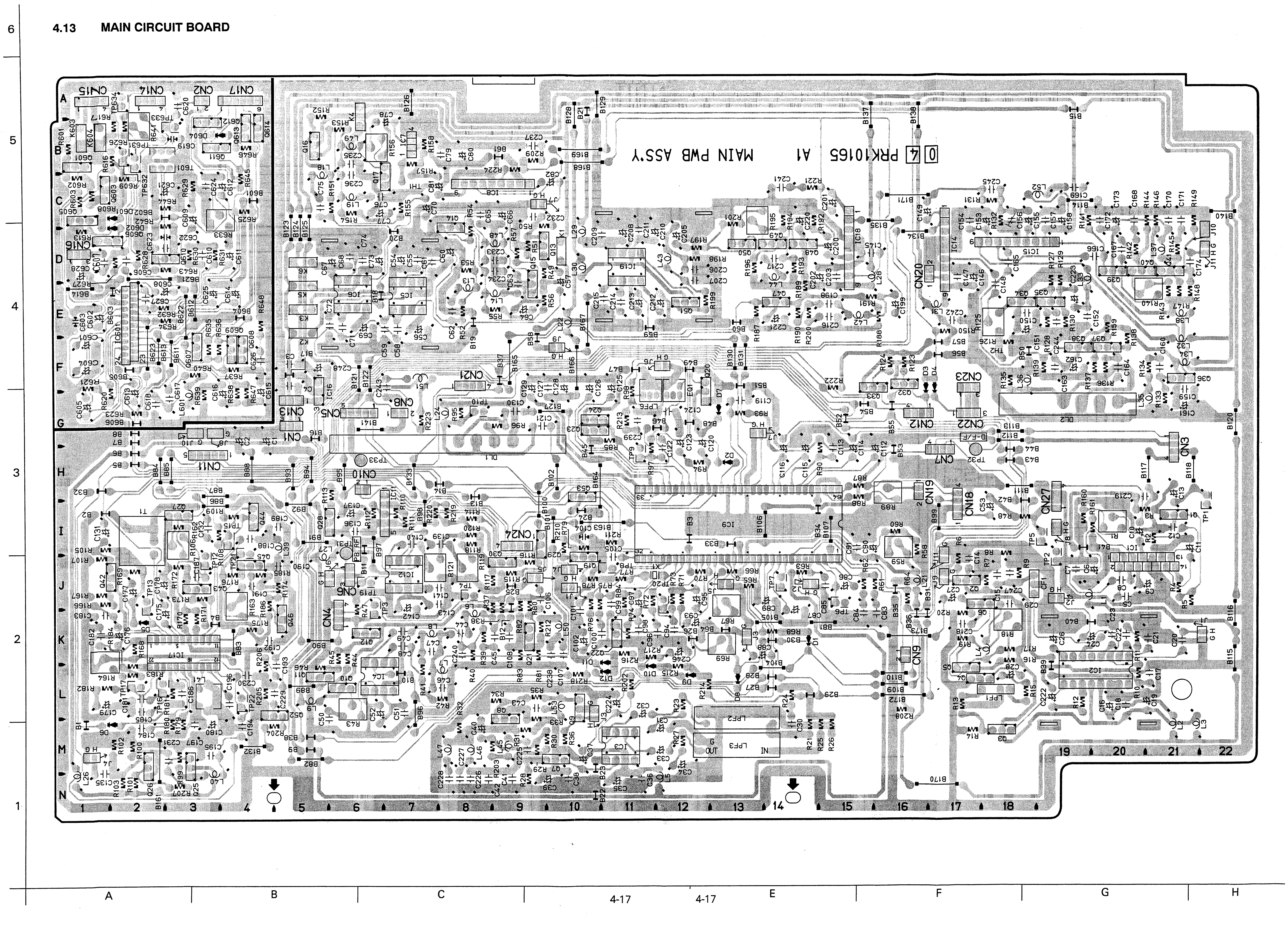
## 4.12 AUDIO (MAIN) SCHEMATIC DIAGRAM


TO REAR
7 6 CN202
AUDIO IN(-8dBs)
GND
GND
AUDIO OUT
CN15
K603
K604
R601 47K
Q605 2SC1740S (RS)
Q606 DTA124ES
R613 22K
R603 2.2K
D601 1SS133
R609 2.2K
D602
R616 1.2K
1SS133
R602 1.5K
R608 1.5K
TP634 AUDIO OUT
Q601 2SC1740S (RS)
Q603 2SC1740S (RS)
R617 1.2K
IC601 BA7751ALS
C603 0.0068
C601 33/16
C602 1/50
C604 33/16
R620 10K
R621 33K
C605 4.7/25
RIPPLE FILTER
Vcc
BIAS
LP:ON
BUFF
MUTE:ON
ALC DET
ALC VR
LINE
PB:ON
PB
REC:ON
REC
MUTE H
PB:H EE:L
REC:H EE:L
LP:H SP:L
GND
SP 1/2
EE 1/2
R623 22K
R625 22K
D604 1SS133
R646 10K
Q613 DTC144EF
Q614 DTC144EF
FROM MECHACON
0 7 CN26
CN17
AUDIO MUTE
REC START
REC
TL (H)
FADC CIN
NC
FROM REGULATOR
0 7 CN4, CN13
CN16
SWD 12V
SWD 5V
GND
C628 100/16
R/P HEAD
A.E HEAD
CN14
TP631
TP632
R626 10
C606 0.010
R627 47
C608 1/50
C627 0.0022
C610 0.01
R632 5.6K
R631 12K
C611 0.22/50
R630 220K
C612 1/50
C613 22/16
R634 10K
C607 0.0022
R628 22K
R629 330
C609 10/16
R633 10K
C624 0.0027
C625 10/16
PB LEVEL
C614 2.2/50
R635 12K
R636 4.7K
R637 39K
R648 10K
R647 3.3K
C615 10/25
C616 10/16
R638 27K
L601 10mH
R640 100
C617 0.027
C626 0.0068
C618 0.015
R639 1.2K
MY
Q607 DTA114ES
F.E HEAD
CN2
TP633 ERASE
BIAS ADJ
R641 47K
C619 330P
C620 0.068
T601
R642 33K
C622 0.0012
R645 27
C621 47/16
R644 100K
C623 0.0047
R643 2.2
Q610 2SC1740S (RS)
Q611 DTA144EF
Q612 DTA114ES
Q608 Q609 2SC1740S (RS)
0 4 AUDIO (MAIN)

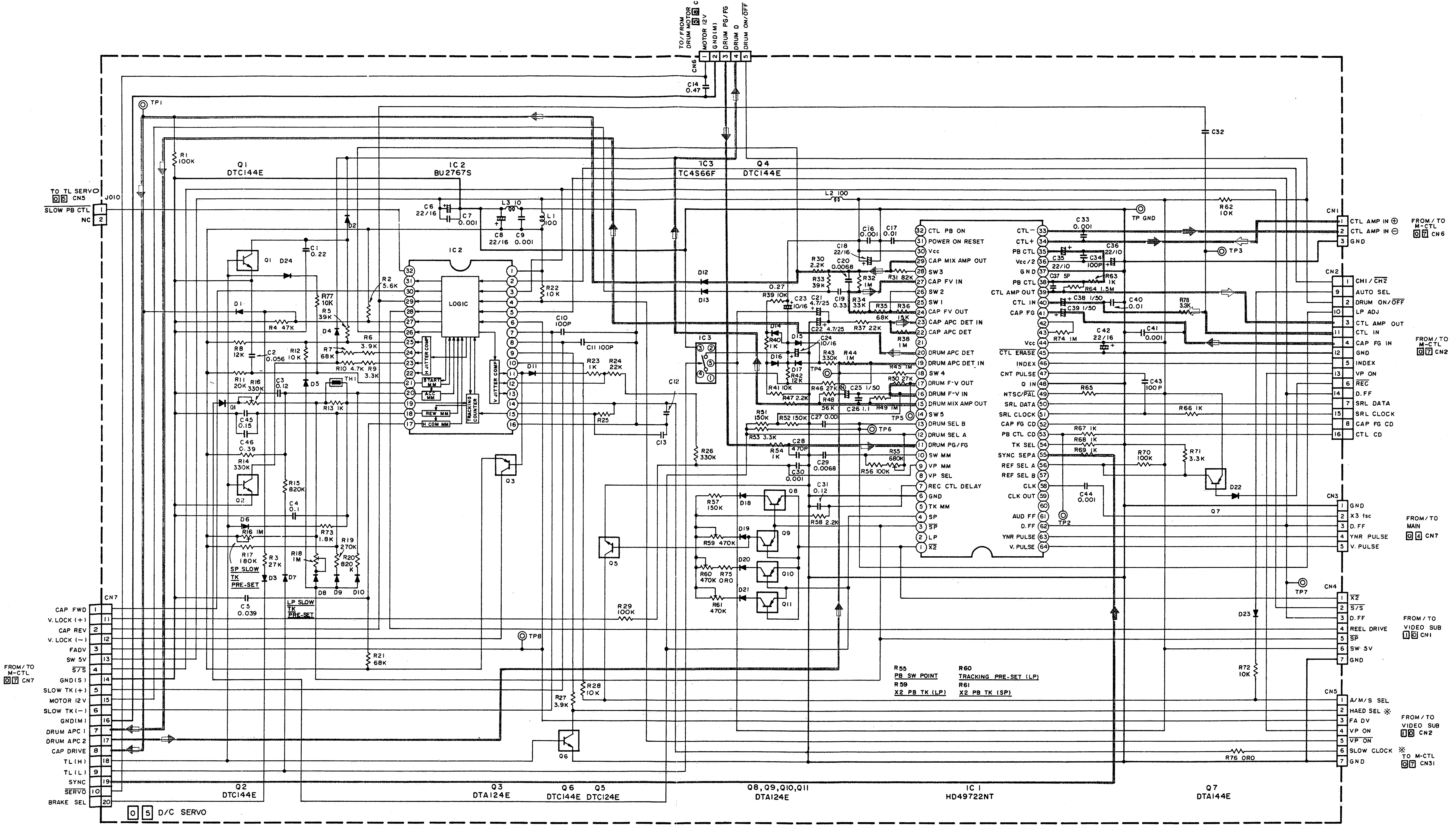
### — AUDIO Voltage —

| Symbol No. | | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC601 | 1 | 5.6 | 5.5 |
| | 2 | 0.0 | 0.0 |
| | 3 | 5.6 | 5.6 |
| | 4 | 12.3 | 12.3 |
| | 5 | 5.6 | 5.7 |
| | 6 | 12.4 | 12.4 |
| | 7 | 5.6 | 5.7 |
| | 8 | 6.2 | 6.2 |
| | 9 | 6.2 | 6.2 |
| | 10 | 6.2 | 6.2 |
| | 11 | 6.2 | 6.2 |
| | 12 | 6.2 | 6.2 |
| | 13 | 0.4 | 0.0 |
| | 14 | 4.8 | 4.8 |
| | 15 | 0.0 | 0.0 |
| | 16 | 6.2 | 6.2 |
| | 17 | 12.3 | 8.1 |
| | 18 | 0.1 | 5.2 |
| | 19 | 6.2 | 6.2 |
| | 20 | 11.0 | 0.6 |
| | 21 | 6.2 | 6.2 |
| | 22 | 0.2 | 0.2 |
| | 23 | 0.0 | 0.0 |
| | 24 | 0.0 | 0.0 |
| **TRANSISTOR** | | | |
| Q601 | B | 0.2 | 0.2 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q603 | B | 0.7 | 0.7 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q605 | B | 0.5 | 0.5 |
| | C | 12.4 | 12.4 |
| | E | 0.2 | 0.2 |
| Q606 | B | 0.5 | 0.5 |
| | C | 12.3 | 12.3 |
| | E | 12.4 | 12.4 |
| Q607 | B | 12.3 | 8.1 |
| | C | -20.3 | 12.3 |
| | E | 12.4 | 12.4 |
| Q608 | B | -20.3 | 0.8 |
| | C | 0.0 | 0.0 |
| | E | -14.0 | 0.0 |
| Q609 | B | -20.5 | 0.7 |
| | C | 0.0 | 0.0 |
| | E | -14.0 | 0.0 |
| Q610 | B | 0.4 | 0.6 |
| | C | 11.0 | 0.6 |
| | E | 0.0 | 0.0 |
| Q611 | B | 0.6 | 0.3 |
| | C | 11.9 | 0.6 |
| | E | 12.3 | 0.3 |
| Q612 | B | 0.3 | 12.3 |
| | C | 12.3 | 0.3 |
| | E | 12.4 | 12.4 |
| Q613 | B | 12.2 | 10.4 |
| | C | 11.9 | 0.6 |
| | E | 11.0 | 0.6 |
| Q614 | B | 0.0 | 0.0 |
| | C | 12.2 | 10.4 |
| | E | 0.0 | 0.0 |
| **CONNECTOR** | | | |
| CN2 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| CN14 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| CN15 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| CN16 | 1 | 12.4 | 12.4 |
| | 2 | 5.4 | 5.4 |
| | 3 | 0.0 | 0.0 |
| CN17 | 1 | 0.0 | 0.0 |
| | 2 | 0.1 | 5.1 |
| | 3 | 0.3 | 12.3 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |

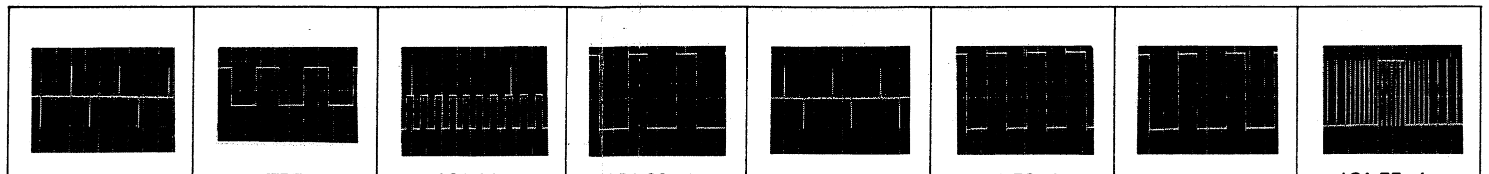
## 4.13 MAIN CIRCUIT BOARD


0 4 PRK10165 A1 MAIN PWB ASS'Y
6
5
4
3
2
1
A
B
C
D
E
F
G
H

## 4.14 D/C SERVO SCHEMATIC DIAGRAM


TO/FROM DRUM MOTOR 0 1 CN1
CN6
1 MOTOR 12V
2 GND(M)
3 DRUM PG/FG
4 DRUM D
5 DRUM ON/OFF
C14 0.47
TP1
R1 100K
Q1 DTC144E
IC2 BU2767S
IC3 TC4S66F
Q4 DTC144E
TO TL SERVO 0 5 CN5
SLOW PB CTL
NC
J010
LOGIC
H JITTER COMP
V JITTER COMP
START MM
ACC MM
REW MM
SL COM MM
TRACKING COUNTER
L2 100
L3 10
L1 100
C6 22/16
C7 0.001
C8 22/16
C9 0.001
C10 100P
C11 100P
C12
C13
TH1
TP GND
TP3
TP4
TP5
TP6
TP7
TP8
TP2
32 CTL PB ON
31 POWER ON RESET
30 Vcc
29 CAP MIX AMP OUT
28 SW3
27 CAP FV IN
26 SW2
25 SW1
24 CAP FV OUT
23 CAP APC DET IN
22 CAP APC DET
21
20 DRUM APC DET
19 DRUM APC DET IN
18 SW4
17 DRUM F-V OUT
16 DRUM F-V IN
15 DRUM MIX AMP OUT
14 SW5
13 DRUM SEL B
12 DRUM SEL A
11 DRUM PG/FG
10 SW MM
9 VP MM
8 VP SEL
7 REC CTL DELAY
6 GND
5 TK MM
4 SP
3 SP
2 LP
1 X2
CTL− 33
CTL+ 34
PB CTL 35
Vcc/2 36
GND 37
PB CTL 38
CTL AMP OUT 39
CTL IN 40
CAP FG 41
42
43
Vcc 44
CTL ERASE 45
INDEX 46
CNT PULSE 47
Q IN 48
NTSC/PAL 49
SRL DATA 50
SRL CLOCK 51
CAP FG CD 52
PB CTL CD 53
TK SEL 54
SYNC SEPA 55
REF SEL A 56
REF SEL B 57
CLK 58
CLK OUT 59
60
AUD FF 61
D.FF 62
YNR PULSE 63
V. PULSE 64
CN1
1 CTL AMP IN ⊕
2 CTL AMP IN ⊖
3 GND
FROM/TO M-CTL 0 7 CN6
CN2
1 CH1/CH2
9 AUTO SEL
2 DRUM ON/OFF
10 LP ADJ
3 CTL AMP OUT
11 CTL IN
4 CAP FG IN
12 GND
5 INDEX
13 VP ON
6 REC
14 D.FF
7 SRL DATA
15 SRL CLOCK
8 CAP FG CD
16 CTL CD
FROM/TO M-CTL 0 7 CN2
CN3
1 GND
2 X3 fsc
3 D.FF
4 YNR PULSE
5 V. PULSE
FROM/TO MAIN 0 4 CN7
CN4
1 X2
2 S/S
3 D.FF
4 REEL DRIVE
5 SP
6 SW 5V
7 GND
FROM/TO VIDEO SUB 1 0 CN1
CN5
1 A/M/S SEL
2 HAED SEL ※
3 FA DV
4 VP ON
5 VP ON
6 SLOW CLOCK ※
7 GND
FROM/TO VIDEO SUB 1 0 CN2
※ TO M-CTL 0 7 CN31
CN7
CAP FWD 1
V. LOCK (+) 11
CAP REV 2
V. LOCK (−) 12
FADV 3
SW 5V 13
S/S 4
GND(S) 14
SLOW TK(+) 5
MOTOR 12V 15
SLOW TK(−) 6
GND(M) 16
DRUM APC 1 7
DRUM APC 2 17
CAP DRIVE 8
TL(H) 18
TL(L) 9
SYNC 19
SERVO 10
BRAKE SEL 20
FROM/TO M-CTL 0 7 CN7
SP SLOW TK PRE-SET
LP SLOW TK PRE-SET
R55 PB SW POINT
R59 X2 PB TK (LP)
R60 TRACKING PRE-SET (LP)
R61 X2 PB TK (SP)
Q2 DTC144E
Q3 DTA124E
Q6 DTC144E
Q5 DTC124E
Q8, Q9, Q10, Q11 DTA124E
IC1 HD49722NT
Q7 DTA144E
0 5 D/C SERVO

## – MAIN WAVEFORMS OF SERVO CIRCUIT –



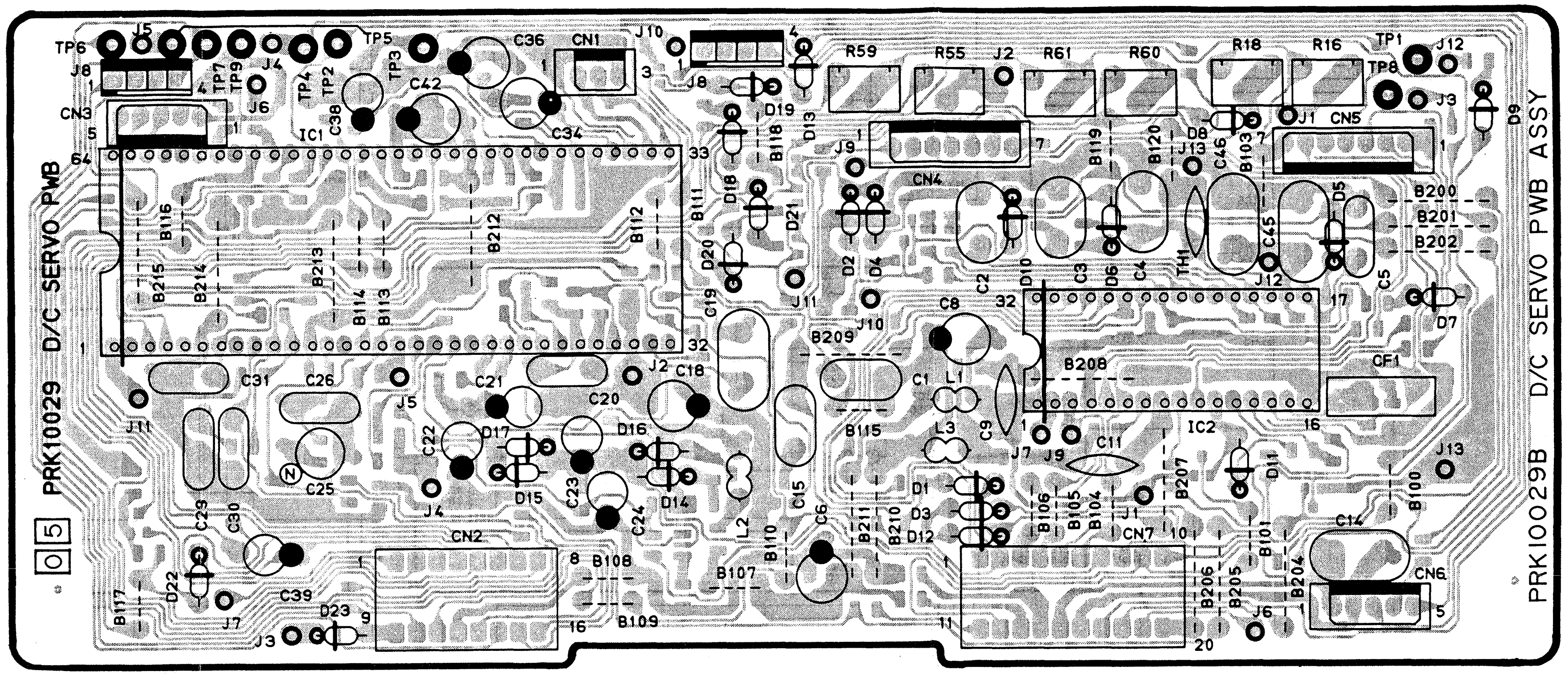
| TP3<br>PB 2.0 Vp-p | TP7<br>5.1 Vp-p 25 Hz | IC1-11<br>4.2 Vp-p | IC1-33 pin<br>REC 5.0 Vp-p<br>25 Hz | IC1-39 pin<br>PB 2.1 Vp-p | IC1-52 pin<br>5.5 Vp-p 504 Hz | IC1-53 pin<br>5.4 Vp-p 25 Hz | IC1-55 pin<br>4.4 Vp-p |
|---|---|---|---|---|---|---|---|

## 4.15 D/C SERVO CIRCUIT BOARD

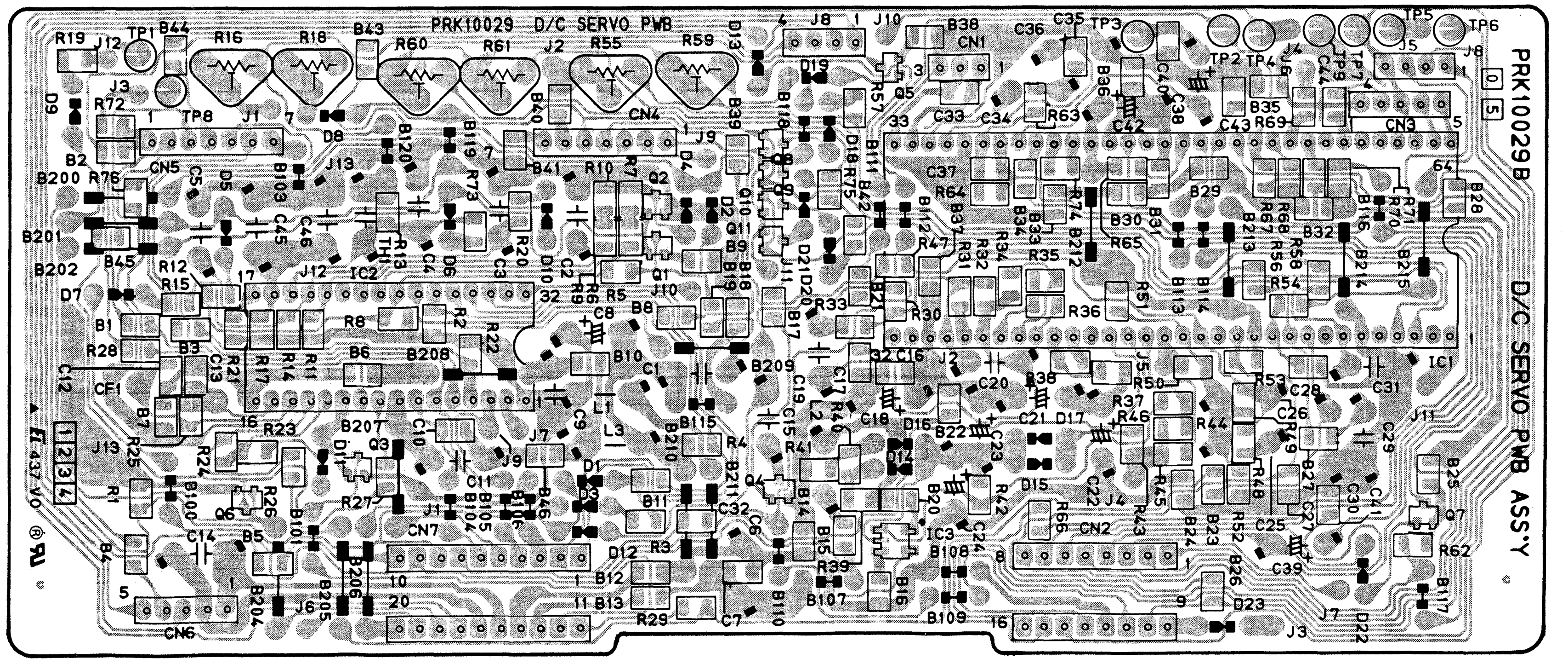
### — D/C SERVO Voltage —

| Symbol | No. | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC1 | 1 | 4.3 | 4.3 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.1 | 0.1 |
| | 4 | 5.1 | 5.1 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.3 | 0.3 |
| | 8 | 0.0 | 0.0 |
| | 9 | 0.0 | 0.0 |
| | 10 | 0.3 | 0.3 |
| | 11 | 1.4 | 1.4 |
| | 12 | 5.0 | 5.0 |
| | 13 | 2.5 | 2.5 |
| | 14 | 5.0 | 5.0 |
| | 15 | 2.5 | 2.5 |
| | 16 | 2.5 | 2.5 |
| | 17 | 2.5 | 2.5 |
| | 18 | 3.3 | 3.3 |
| | 19 | 2.5 | 2.5 |
| | 20 | 2.5 | 2.5 |
| | 21 | 2.5 | 2.5 |
| | 22 | 2.6 | 2.6 |
| | 23 | 2.6 | 2.6 |
| | 24 | 2.5 | 2.5 |
| | 25 | 2.5 | 2.5 |
| | 26 | 2.5 | 2.5 |
| | 27 | 2.5 | 2.5 |
| | 28 | 3.7 | 3.7 |
| | 29 | 3.7 | 3.7 |
| | 30 | 5.0 | 5.0 |
| | 31 | 5.0 | 5.0 |
| | 32 | 0.0 | 0.0 |
| | 33 | 1.8 | 1.8 |
| | 34 | 3.0 | 3.0 |
| | 35 | 2.5 | 2.5 |
| | 36 | 2.5 | 2.5 |
| | 37 | 0.0 | 0.0 |
| | 38 | 2.5 | 2.5 |
| | 39 | 2.5 | 2.5 |
| | 40 | 2.5 | 2.5 |
| | 41 | 2.2 | 2.2 |
| | 42 | 2.2 | 2.2 |
| | 43 | 2.5 | 2.5 |
| | 44 | 5.0 | 5.0 |
| | 45 | 0.0 | 0.0 |
| | 46 | 0.0 | 0.0 |
| | 47 | 4.0 | 4.0 |
| | 48 | 0.0 | 0.0 |
| | 49 | 2.5 | 2.5 |
| | 50 | 0.1 | 0.1 |
| | 51 | 0.8 | 0.8 |
| | 52 | 2.5 | 2.5 |
| | 53 | 5.0 | 5.0 |
| | 54 | 0.1 | 0.1 |
| | 55 | 0.4 | 0.4 |
| | 56 | 5.0 | 5.0 |
| | 57 | 0.0 | 0.0 |
| | 58 | 2.3 | 2.3 |
| | 59 | 2.6 | 2.6 |
| | 60 | 2.5 | 2.5 |
| | 61 | 0.0 | 0.0 |
| | 62 | 0.0 | 0.0 |
| | 63 | 4.6 | 4.6 |
| | 64 | 0.0 | 0.0 |
| IC2 | 1 | 5.0 | 5.0 |
| | 2 | 4.4 | 4.4 |
| | 3 | 5.0 | 5.0 |
| | 4 | 5.0 | 5.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 5.0 | 5.0 |
| | 7 | 5.1 | 5.1 |
| | 8 | 5.1 | 5.1 |
| IC2 | 9 | 0.0 | 0.0 |
| | 10 | 0.0 | 0.0 |
| | 11 | 2.6 | 2.6 |
| | 12 | 0.0 | 0.0 |
| | 13 | 2.5 | 2.5 |
| | 14 | 2.4 | 2.4 |
| | 15 | 0.0 | 0.0 |
| | 16 | 0.1 | 0.1 |
| | 17 | 0.1 | 0.1 |
| | 18 | 0.0 | 0.0 |
| | 19 | 0.1 | 0.1 |
| | 20 | 0.0 | 0.0 |
| | 21 | 0.0 | 0.0 |
| | 22 | 0.1 | 0.1 |
| | 23 | 0.2 | 0.2 |
| | 24 | 0.2 | 0.2 |
| | 25 | 0.0 | 0.0 |
| | 26 | 3.6 | 3.6 |
| | 27 | 0.0 | 0.0 |
| | 28 | 5.0 | 5.0 |
| | 29 | 5.1 | 5.1 |
| | 30 | 0.1 | 0.1 |
| | 31 | — | — |
| | 32 | 5.0 | 5.0 |
| IC3 | 1 | 2.5 | 2.5 |
| | 2 | 2.5 | 2.5 |
| | 3 | 0.0 | 0.0 |
| | 4 | 5.1 | 5.1 |
| | 5 | 5.0 | 5.0 |
| **TRANSISTOR** | | | |
| Q1 | B | 0.3 | 0.3 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q2 | B | 0.3 | 0.3 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q3 | B | 2.6 | 2.6 |
| | C | 2.7 | 2.7 |
| | E | 5.0 | 5.0 |
| Q4 | B | 4.9 | 4.9 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q5 | B | 0.0 | 0.0 |
| | C | 4.3 | 4.3 |
| | E | 0.0 | 0.0 |
| Q6 | B | 0.3 | 0.3 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q7 | B | 0.0 | 0.0 |
| | C | 5.0 | 5.0 |
| | E | 5.0 | 5.0 |
| Q8 | B | 0.1 | 0.1 |
| | C | 4.3 | 4.3 |
| | E | 4.3 | 4.3 |
| Q9 | B | 4.3 | 4.3 |
| | C | 0.0 | 0.0 |
| | E | 0.1 | 0.1 |
| Q10 | B | 5.1 | 5.1 |
| | C | 0.0 | 0.0 |
| | E | 4.3 | 4.3 |
| Q11 | B | 4.3 | 4.3 |
| | C | 0.0 | 0.0 |
| | E | 5.1 | 5.1 |
| **CONNECTOR** | | | |
| CN1 | 1 | 3.0 | 3.0 |
| | 2 | 1.8 | 1.8 |
| | 3 | 0.0 | 0.0 |
| CN2 | 1 | 5.1 | 5.1 |
| | 2 | 4.4 | 4.4 |
| | 3 | 2.5 | 2.5 |
| | 4 | 0.4 | 0.4 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.4 | 0.4 |
| | 7 | 0.1 | 0.1 |
| | 8 | 2.5 | 2.5 |
| | 9 | 0.0 | 0.0 |
| | 10 | 2.5 | 2.5 |
| | 11 | 2.5 | 2.5 |
| | 12 | 0.0 | 0.0 |
| | 13 | 1.2 | 1.2 |
| | 14 | — | — |
| | 15 | 0.5 | 0.5 |
| | 16 | 5.0 | 5.0 |
| CN3 | 1 | 0.0 | 0.0 |
| | 2 | 1.8 | 1.8 |
| | 3 | — | — |
| | 4 | 4.6 | 4.6 |
| | 5 | 0.1 | 0.1 |
| CN4 | 1 | 4.9 | 4.9 |
| | 2 | 5.0 | 5.0 |
| | 3 | — | — |
| | 4 | 5.0 | 5.0 |
| | 5 | 0.1 | 0.1 |
| | 6 | 5.0 | 5.0 |
| | 7 | 0.0 | 0.0 |
| CN5 | 1 | 4.3 | 4.3 |
| | 2 | 0.0 | 0.0 |
| | 3 | 5.0 | 5.0 |
| | 4 | 1.2 | 1.2 |
| | 5 | 5.0 | 5.0 |
| | 6 | 2.4 | 2.4 |
| | 7 | 0.0 | 0.0 |
| CN6 | 1 | 0.4 | 0.4 |
| | 2 | 0.0 | 0.0 |
| | 3 | 1.3 | 1.3 |
| | 4 | 2.5 | 2.5 |
| | 5 | 4.5 | 4.5 |
| CN7 | 1 | 0.1 | 0.1 |
| | 2 | 5.1 | 5.1 |
| | 3 | 5.0 | 5.0 |
| | 4 | 5.0 | 5.0 |
| | 5 | 5.1 | 5.1 |
| | 6 | 5.1 | 5.1 |
| | 7 | 2.5 | 2.5 |
| | 8 | 3.1 | 3.1 |
| | 9 | 4.9 | 4.9 |
| | 10 | 5.1 | 5.1 |
| | 11 | 0.6 | 0.6 |
| | 12 | 2.7 | 2.7 |
| | 13 | 5.0 | 5.0 |
| | 14 | 0.0 | 0.0 |
| | 15 | 12.3 | 12.3 |
| | 16 | 0.0 | 0.0 |
| | 17 | 2.3 | 2.3 |
| | 18 | 0.3 | 0.3 |
| | 19 | 0.4 | 0.4 |
| | 20 | 0.3 | 0.3 |

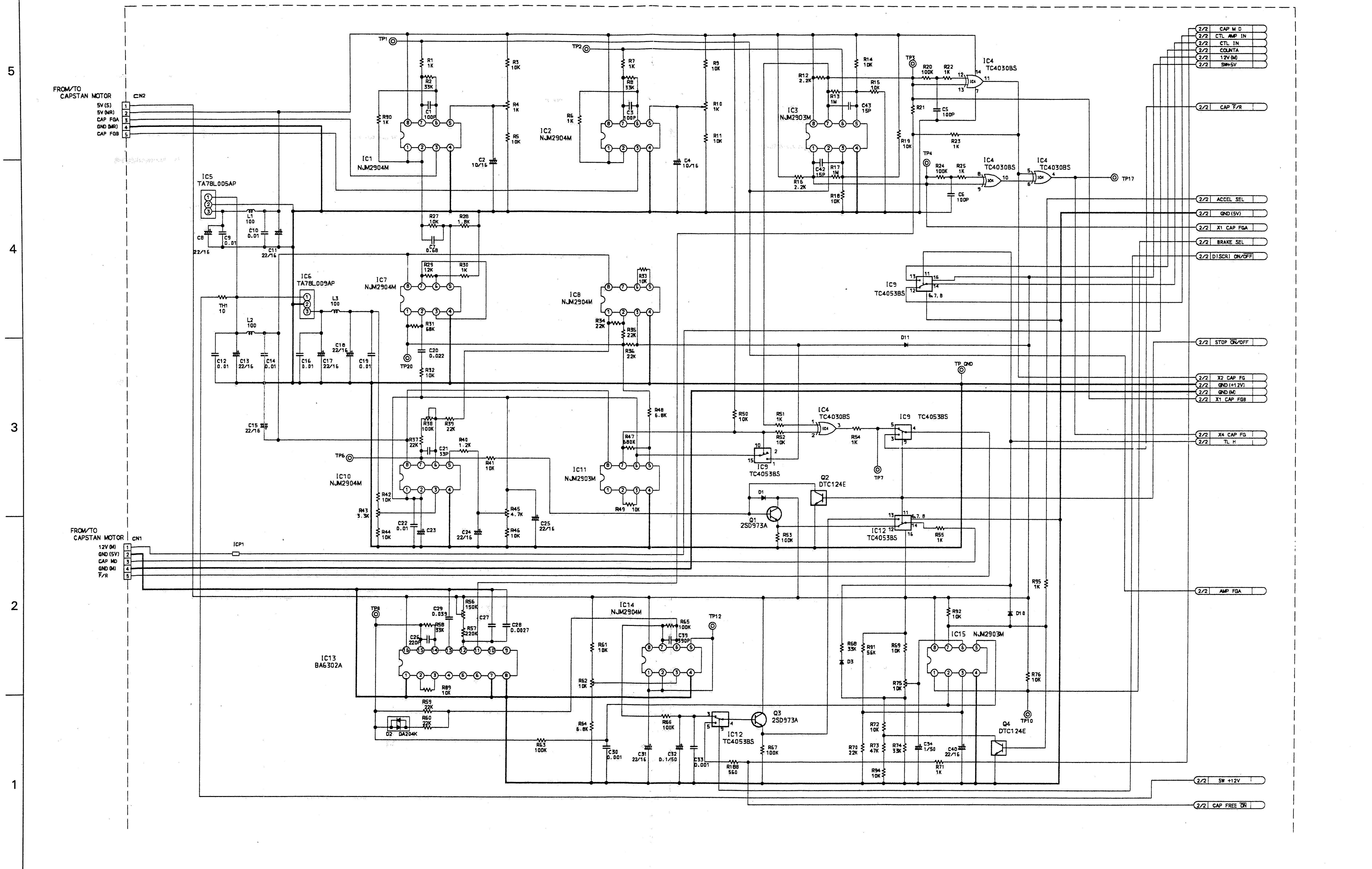
### — Parts side —


PRK10029 D/C SERVO PWB
PRK10029B D/C SERVO PWB ASSY
IC1
IC2
CN1
CN2
CN3
CN4
CN5
CN6
CN7

### — Solder side —

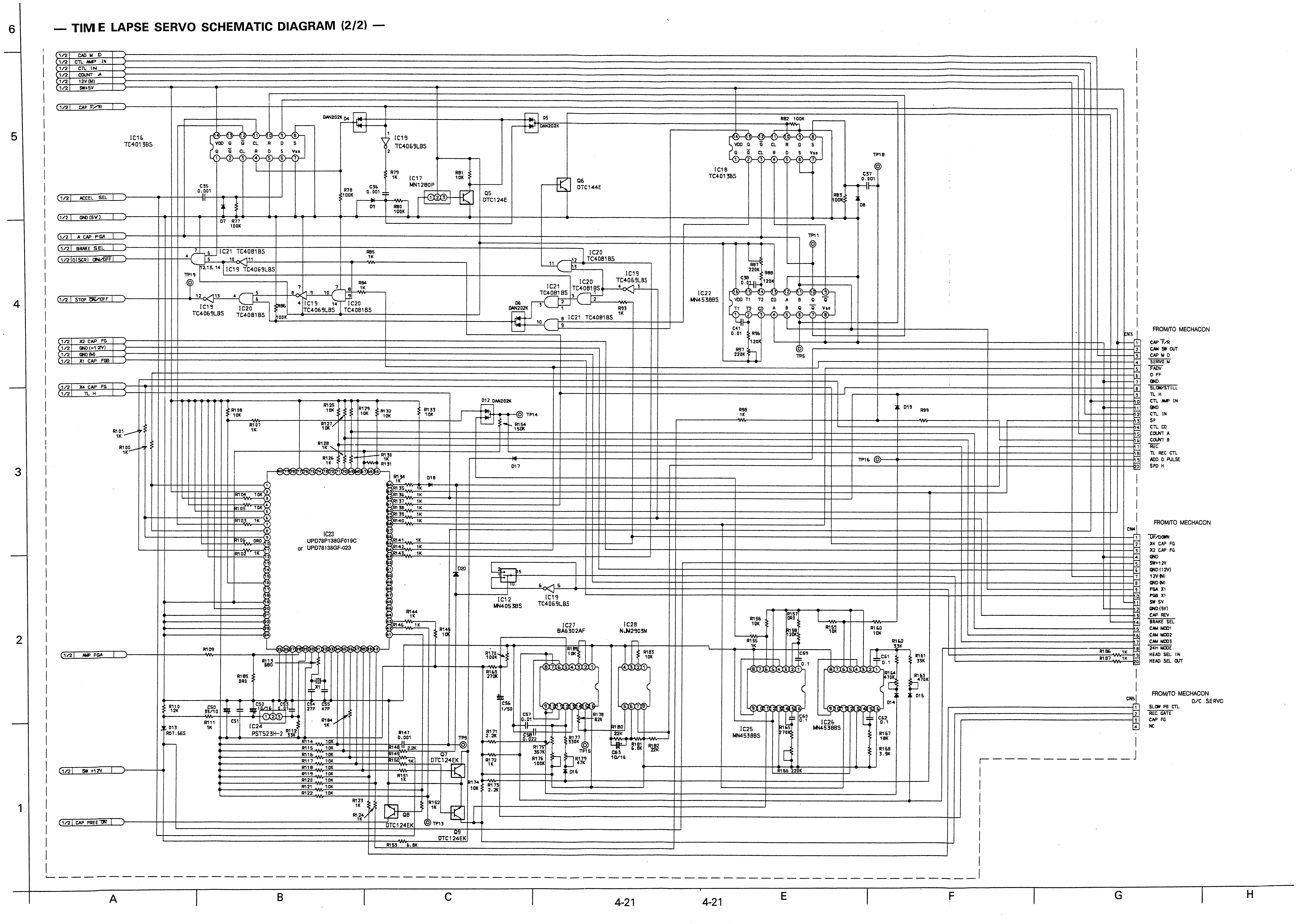

PRK10029 D/C SERVO PWB
PRK10029B
D/C SERVO PWB ASS'Y
IC1
IC2
IC3
CN1
CN2
CN3
CN4
CN5
CN6
CN7

## 4.16 TIME LAPSE SERVO SCHEMATIC DIAGRAM (1/2)



6
5
4
3
2
1
FROM/TO CAPSTAN MOTOR
CN2
5V (S)
5V (MR)
CAP FGA
GND (MR)
CAP FGB
FROM/TO CAPSTAN MOTOR
CN1
12V (M)
GND (5V)
CAP MD
GND (M)
F̄/R
ICP1
IC1 NJM2904M
IC2 NJM2904M
IC3 NJM2903M
IC4 TC4030BS
IC5 TA78L005AP
IC6 TA78L009AP
IC7 NJM2904M
IC8 NJM2904M
IC9 TC4053BS
IC10 NJM2904M
IC11 NJM2903M
IC12 TC4053BS
IC13 BA6302A
IC14 NJM2904M
IC15 NJM2903M
Q1 2SD973A
Q2 DTC124E
Q3 2SD973A
Q4 DTC124E
D1
D2 DA204K
D3
D10
D11
TH1 10
L1 100
L2 100
L3 100
TP1
TP2
TP3
TP4
TP6
TP7
TP8
TP10
TP12
TP17
TP20
TP GND
R1 1K
R2 33K
R3 10K
R4 1K
R5 10K
R6 1K
R7 1K
R8 33K
R9 10K
R10 1K
R11 10K
R12 2.2K
R13 1M
R14 10K
R15 10K
R16 2.2K
R17 1M
R18 10K
R19 10K
R20 100K
R21
R22 1K
R23 1K
R24 100K
R25 1K
R27 10K
R28 1.8K
R29 12K
R30 1K
R31 68K
R32 10K
R33 10K
R34 22K
R35 22K
R36 22K
R37 22K
R38 100K
R39 22K
R40 1.2K
R41 10K
R42 10K
R43 3.3K
R44 10K
R45 4.7K
R46 10K
R47 680K
R48 6.8K
R49 10K
R50 10K
R51 1K
R52 10K
R53 100K
R54 1K
R55 1K
R56 150K
R57 220K
R58 33K
R59 22K
R60 22K
R61 10K
R62 10K
R63 100K
R64 6.8K
R65 100K
R66 100K
R67 100K
R68 33K
R69 10K
R70 22K
R71 1K
R72 10K
R73 47K
R74 33K
R75 10K
R76 10K
R89 10K
R90 1K
R91 56K
R92 10K
R94 10K
R95 1K
R188 560
C1 100P
C2 10/16
C3 100P
C4 10/16
C5 100P
C6 100P
C7 0.68
C8 22/16
C9 0.01
C10 0.01
C11 22/16
C12 0.01
C13 22/16
C14 0.01
C15 22/16
C16 0.01
C17 22/16
C18 22/16
C19 0.01
C20 0.022
C21 33P
C22 0.01
C23
C24 22/16
C25 22/16
C26 220P
C27
C28 0.0027
C29 0.039
C30 0.001
C31 22/16
C32 0.1/50
C33 0.001
C34 1/50
C39 390P
C40 22/16
C42 15P
C43 15P
2/2 CAP M D
2/2 CTL AMP IN
2/2 CTL IN
2/2 COUNTA
2/2 12V (M)
2/2 SW+5V
2/2 CAP F̄/R
2/2 ACCEL SEL
2/2 GND (5V)
2/2 X1 CAP FGA
2/2 BRAKE SEL
2/2 DISCRI ON/O̅F̅F̅
2/2 STOP O̅N̅/OFF
2/2 X2 CAP FG
2/2 GND (+12V)
2/2 GND (M)
2/2 X1 CAP FGB
2/2 X4 CAP FG
2/2 TL H
2/2 AMP FGA
2/2 SW +12V
2/2 CAP FREE O̅N̅
A
B
C
E
F
G
H

# — TIME LAPSE SERVO SCHEMATIC DIAGRAM (2/2) —


1/2 CAD M D
1/2 CTL AMP IN
1/2 CTL IN
1/2 COUNT A
1/2 12V (M)
1/2 SW+5V
1/2 CAP F/R
1/2 ACCEL SEL
1/2 GND (5V)
1/2 A CAP FGA
1/2 BRAKE SEL
1/2 DISCRI ON/OFF
1/2 STOP ON/OFF
1/2 X2 CAP FG
1/2 GND (+12V)
1/2 GND (M)
1/2 X1 CAP FGB
1/2 X4 CAP FG
1/2 TL H
1/2 AMP FGA
1/2 SW +12V
1/2 CAP FREE ON
IC16 TC4013BS
IC18 TC4013BS
IC17 MN1280P
IC19 TC4069LBS
IC20 TC4081BS
IC21 TC4081BS
IC22 MN4538BS
IC23 UPD78P138GF019C or UPD78138GF-023
IC24 PST523H-2
IC12 MN4053BS
IC25 MN4538BS
IC26 MN4538BS
IC27 BA6302AF
IC28 NJM2903M
Q5 DTC124E
Q6 DTC144E
Q7 DTC124EK
Q8 DTC124EK
Q9 DTC124EK
D4 DAN202K
D5 DAN202K
D6 DAN202K
D12 DAN202K
D13 RD7.5ES
X1
TP5
TP9
TP11
TP13
TP14
TP15
TP16
TP18
TP19
FROM/TO MECHACON
CN3
1 CAP F/R
2 CAM SW OUT
3 CAP M D
4 SERVO M
5 FADV
6 D FF
7 GND
8 SLOW/STILL
9 TL H
10 CTL AMP IN
11 GND
12 CTL IN
13 SP
14 CTL CD
15 COUNT A
16 COUNT B
17 REC
18 TL REC CTL
19 ADD D PULSE
20 SPD H
FROM/TO MECHACON
CN4
1 UP/DOWN
2 X4 CAP FG
3 X2 CAP FG
4 GND
5 SW+12V
6 GND (12V)
7 12V (M)
8 GND (M)
9 FGA X1
10 FGB X1
11 SW 5V
12 GND (5V)
13 CAP REV
14 BRAKE SEL
15 CAM MOD1
16 CAM MOD2
17 CAM MOD3
18 24H MODE
19 HEAD SEL IN
20 HEAD SEL OUT
R186 1K
R187 1K
FROM/TO MECHACON D/C SERVO
CN5
1 SLOW PB CTL
2 REC GATE
3 CAP FG
4 NC
A
B
C
E
F
G
H
1
2
3
4
5
6

## — TIME LAPSE SERVO Voltage —

| Symbol No. | | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC1 | 1 | 2.5 | 2.5 |
| | 2 | 2.5 | 2.5 |
| | 3 | 2.5 | 2.5 |
| | 4 | 0.0 | 0.0 |
| | 5 | 2.5 | 2.5 |
| | 6 | 2.5 | 2.5 |
| | 7 | 2.1 | 2.1 |
| | 8 | 5.0 | 5.0 |
| IC2 | 1 | 2.5 | 2.5 |
| | 2 | 2.5 | 2.5 |
| | 3 | 2.5 | 2.5 |
| | 4 | 0.0 | 0.0 |
| | 5 | 2.5 | 2.5 |
| | 6 | 2.5 | 2.5 |
| | 7 | 3.7 | 3.7 |
| | 8 | 5.0 | 5.0 |
| IC3 | 1 | 1.0 | 1.0 |
| | 2 | 2.4 | 2.4 |
| | 3 | 2.5 | 2.5 |
| | 4 | 0.0 | 0.0 |
| | 5 | 2.5 | 2.5 |
| | 6 | 2.0 | 2.0 |
| | 7 | 4.7 | 4.7 |
| | 8 | 5.0 | 5.0 |
| IC4 | 1 | 1.2 | 1.2 |
| | 2 | 3.6 | 3.6 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| | 8 | 1.4 | 1.4 |
| | 9 | 1.4 | 1.4 |
| | 10 | 0.0 | 0.0 |
| | 11 | 0.0 | 0.0 |
| | 12 | 4.2 | 4.2 |
| | 13 | 3.8 | 3.8 |
| | 14 | 5.0 | 5.0 |
| IC5 | 1 | 5.0 | 5.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 12.2 | 12.2 |
| IC6 | 1 | 9.1 | 9.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 12.2 | 12.2 |
| IC7 | 1 | 5.0 | 5.0 |
| | 2 | 5.0 | 5.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.1 | 0.1 |
| | 5 | 0.4 | 0.4 |
| | 6 | 0.4 | 0.4 |
| | 7 | 5.0 | 5.0 |
| | 8 | 12.2 | 12.2 |
| IC8 | 1 | 4.2 | 4.2 |
| | 2 | 4.9 | 4.9 |
| | 3 | 4.9 | 4.9 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.6 | 0.6 |
| | 6 | 0.6 | 0.6 |
| | 7 | 11.0 | 11.0 |
| | 8 | 12.2 | 12.2 |
| IC9 | 1 | 4.9 | 4.6 |
| | 2 | 3.5 | 4.9 |
| | 3 | 3.0 | 4.5 |
| | 4 | 2.9 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| IC9 | 7 | 0.2 | 0.1 |
| | 8 | 0.2 | 0.3 |
| | 9 | 0.0 | 0.1 |
| | 10 | 4.2 | 0.0 |
| | 11 | 5.0 | 0.0 |
| | 12 | 2.5 | 2.5 |
| | 13 | 2.0 | 0.2 |
| | 14 | 1.1 | 2.5 |
| | 15 | 5.0 | 5.0 |
| | 16 | 5.1 | 5.1 |
| IC10 | 1 | 5.0 | 5.0 |
| | 2 | 5.0 | 5.0 |
| | 3 | 5.0 | 5.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 4.2 | 4.2 |
| | 6 | 4.2 | 4.2 |
| | 7 | 4.2 | 4.2 |
| | 8 | 12.2 | 12.2 |
| IC11 | 1 | 0.0 | 0.0 |
| | 2 | 0.3 | 0.3 |
| | 3 | 0.3 | 0.3 |
| | 4 | 0.0 | 0.0 |
| | 5 | 5.0 | 5.0 |
| | 6 | 5.0 | 5.0 |
| | 7 | 3.5 | 3.5 |
| | 8 | 12.2 | 12.2 |
| IC12 | 1 | 5.1 | 0.3 |
| | 2 | 0.0 | 2.5 |
| | 3 | 2.7 | 3.3 |
| | 4 | 0.0 | 2.6 |
| | 5 | 3.9 | 2.6 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| | 8 | 0.0 | 0.0 |
| | 9 | 0.3 | 0.0 |
| | 10 | 0.0 | 0.0 |
| | 11 | 3.9 | 2.5 |
| | 12 | 0.2 | 1.9 |
| | 13 | 1.8 | 1.7 |
| | 14 | 1.8 | 2.7 |
| | 15 | 0.0 | 5.1 |
| | 16 | 5.1 | 5.1 |
| IC13 | 1 | 0.0 | 0.0 |
| | 2 | 1.3 | 1.3 |
| | 3 | 1.3 | 1.3 |
| | 4 | 2.6 | 2.6 |
| | 5 | 1.1 | 1.1 |
| | 6 | 4.4 | 4.4 |
| | 7 | 0.0 | 0.0 |
| | 8 | 0.0 | 0.0 |
| | 9 | 0.0 | 0.0 |
| | 10 | 0.1 | 0.1 |
| | 11 | 0.0 | 0.0 |
| | 12 | 4.3 | 4.3 |
| | 13 | 3.4 | 3.4 |
| | 14 | 2.6 | 2.6 |
| | 15 | 1.4 | 1.4 |
| | 16 | 5.1 | 5.1 |
| IC14 | 1 | 2.5 | 2.5 |
| | 2 | 2.5 | 2.5 |
| | 3 | 2.5 | 2.5 |
| | 4 | 0.0 | 0.0 |
| | 5 | 2.5 | 2.5 |
| | 6 | 1.7 | 1.7 |
| | 7 | 3.8 | 3.8 |
| | 8 | 5.1 | 5.1 |
| IC15 | 1 | 3.3 | 3.3 |
| | 2 | 1.6 | 1.6 |
| | 3 | 1.4 | 1.4 |
| | 4 | 0.0 | 0.0 |
| IC15 | 5 | 1.7 | 1.7 |
| | 6 | 2.5 | 2.5 |
| | 7 | 0.1 | 0.1 |
| | 8 | 5.1 | 5.1 |
| IC16 | 1 | 0.1 | 0.0 |
| | 2 | 0.0 | 5.1 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.5 | 2.8 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| | 8 | 0.0 | 0.0 |
| | 9 | 4.7 | 0.0 |
| | 10 | 4.7 | 0.0 |
| | 11 | 2.3 | 0.0 |
| | 12 | 0.0 | 3.1 |
| | 13 | 0.0 | 0.0 |
| | 14 | 5.1 | 5.1 |
| IC17 | 1 | 4.7 | 4.7 |
| | 2 | 5.1 | 5.1 |
| | 3 | 0.0 | 0.0 |
| IC18 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 2.7 | 0.0 |
| | 4 | 0.0 | 4.0 |
| | 5 | 0.0 | 3.5 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| | 8 | 0.0 | 0.0 |
| | 9 | 0.0 | 0.0 |
| | 10 | 0.0 | 0.0 |
| | 11 | 0.0 | 0.0 |
| | 12 | 5.1 | 0.0 |
| | 13 | 0.0 | 0.0 |
| | 14 | 5.1 | 5.1 |
| IC19 | 1 | 0.1 | 4.9 |
| | 2 | 0.0 | 4.9 |
| | 3 | 3.8 | 5.1 |
| | 4 | 2.7 | 5.1 |
| | 5 | 0.0 | 2.4 |
| | 6 | 5.1 | 2.7 |
| | 7 | 0.0 | 0.0 |
| | 8 | 5.1 | 5.1 |
| | 9 | 0.0 | 0.0 |
| | 10 | 5.1 | 5.1 |
| | 11 | 0.0 | 0.0 |
| | 12 | 4.1 | 0.0 |
| | 13 | 0.0 | 0.0 |
| | 14 | 5.1 | 5.1 |
| IC20 | 1 | -0.1 | 0.3 |
| | 2 | 3.6 | 5.1 |
| | 3 | 0.2 | 0.0 |
| | 4 | 5.1 | 0.0 |
| | 5 | 5.1 | 5.1 |
| | 6 | 4.6 | 4.6 |
| | 7 | 0.0 | 0.0 |
| | 8 | 5.1 | 5.1 |
| | 9 | 0.0 | 0.0 |
| | 10 | 0.0 | 0.0 |
| | 11 | 0.0 | 0.0 |
| | 12 | 5.1 | 5.1 |
| | 13 | 3.4 | 2.3 |
| | 14 | 5.1 | 5.1 |
| IC21 | 1 | 5.1 | 5.1 |
| | 2 | 0.2 | 0.2 |
| | 3 | 0.2 | 0.2 |
| | 4 | 0.0 | 0.0 |
| | 5 | 5.1 | 5.1 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| IC21 | 8 | 5.1 | 5.1 |
| | 9 | 4.9 | 4.9 |
| | 10 | 4.9 | 4.9 |
| | 11 | 5.1 | 5.1 |
| | 12 | 5.1 | 5.1 |
| | 13 | 5.1 | 5.1 |
| | 14 | 5.1 | 5.1 |
| IC22 | 1 | 0.0 | 0.0 |
| | 2 | 4.1 | 4.1 |
| | 3 | 5.1 | 5.1 |
| | 4 | 0.0 | 0.0 |
| | 5 | 3.4 | 3.4 |
| | 6 | 2.1 | 2.1 |
| | 7 | 4.1 | 4.1 |
| | 8 | 0.0 | 0.0 |
| | 9 | 4.7 | 4.7 |
| | 10 | 1.1 | 1.1 |
| | 11 | 4.5 | 4.5 |
| | 12 | 0.0 | 0.0 |
| | 13 | 5.1 | 5.1 |
| | 14 | 3.6 | 3.6 |
| | 15 | 0.0 | 0.0 |
| | 16 | 5.1 | 5.1 |
| IC23 | 1 | . | . |
| | 2 | . | . |
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| | 51 | . | . |
| IC23 | 52 | . | . |
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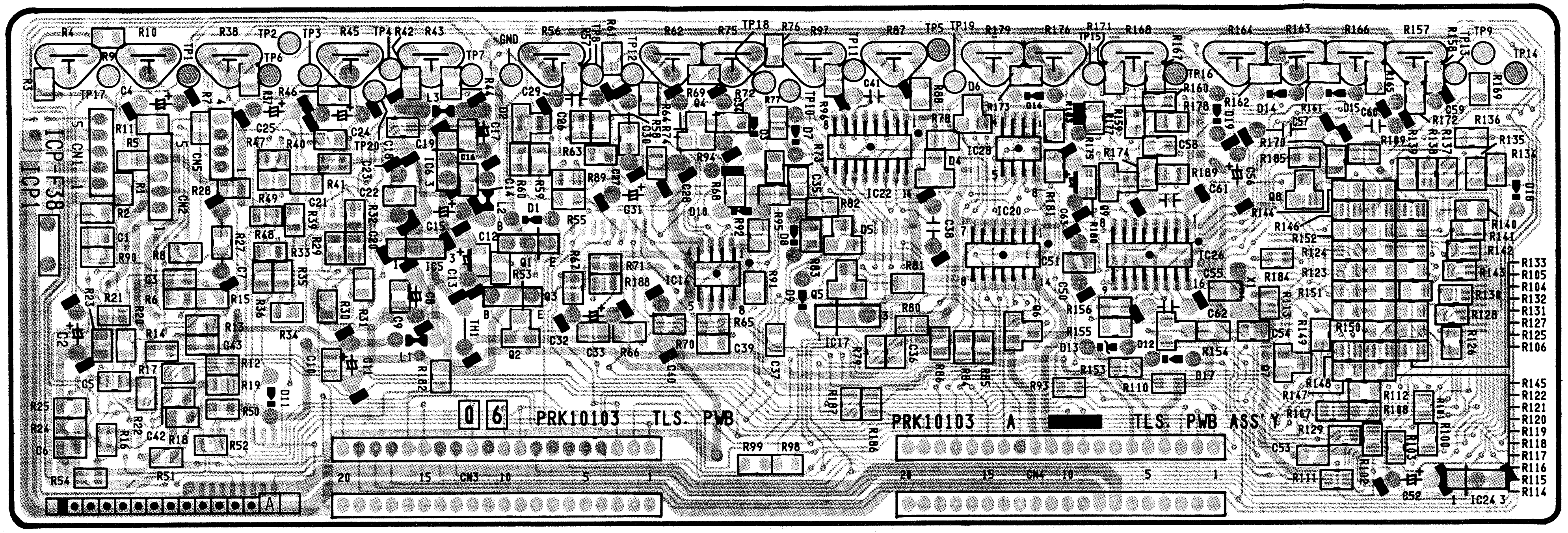
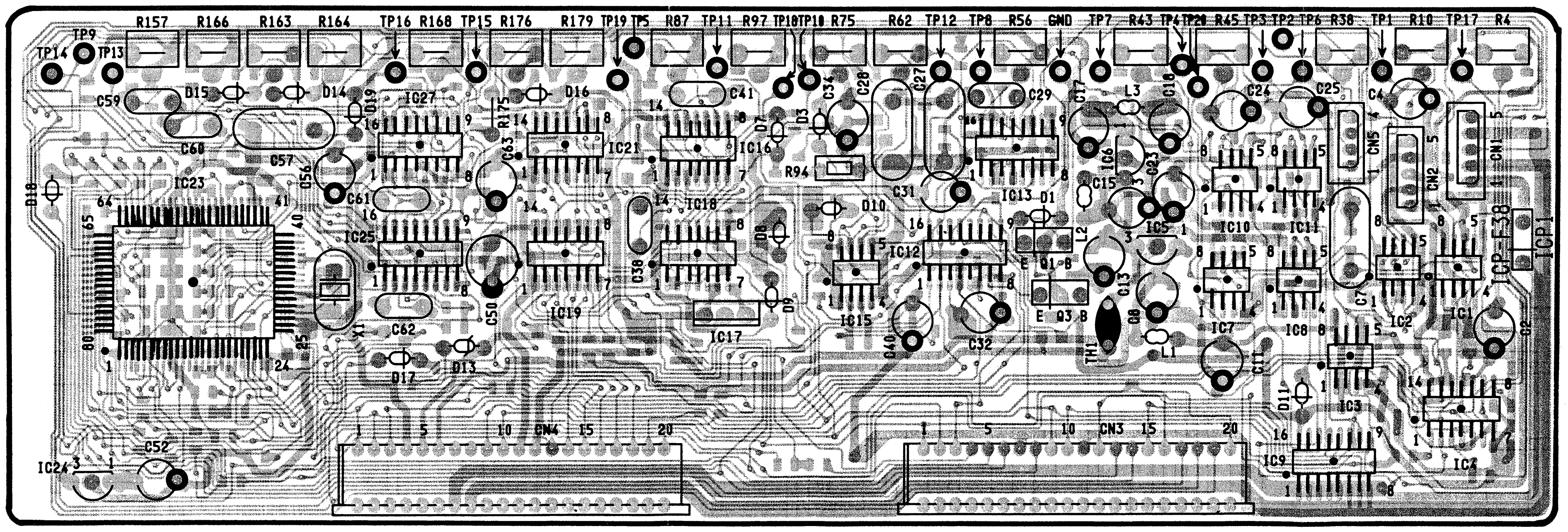
| | 80 | . | . |
| IC24 | 1 | 5.1 | 5.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 5.0 | 5.0 |
| IC25 | 1 | 0.0 | 0.0 |
| | 2 | 4.4 | 5.0 |
| | 3 | 5.1 | 5.1 |
| | 4 | 0.0 | 5.1 |
| | 5 | 5.1 | 5.1 |
| | 6 | 0.3 | 0.1 |
| | 7 | 4.5 | 5.1 |
| | 8 | 0.0 | 0.0 |
| | 9 | 5.1 | 5.1 |
| | 10 | 4.8 | 0.0 |
| | 11 | 5.0 | 5.1 |
| | 12 | 0.0 | 0.0 |
| | 13 | 5.1 | 5.1 |
| | 14 | 4.4 | 4.9 |
| | 15 | 0.0 | 0.0 |
| | 16 | 5.1 | 5.1 |
| IC26 | 1 | 0.0 | 0.0 |
| | 2 | 4.3 | 4.3 |
| | 3 | 5.1 | 5.1 |
| | 4 | 5.1 | 5.1 |
| | 5 | 5.1 | 5.1 |
| | 6 | 0.1 | 0.1 |
| | 7 | 5.1 | 5.1 |
| | 8 | 0.0 | 0.0 |
| | 9 | 5.1 | 5.1 |
| | 10 | 0.0 | 0.0 |
| | 11 | 5.1 | 5.1 |
| | 12 | 0.0 | 0.0 |
| | 13 | 5.1 | 5.1 |
| | 14 | 5.1 | 5.1 |
| | 15 | 0.0 | 0.0 |
| | 16 | 5.1 | 5.1 |
| IC27 | 1 | 0.0 | 0.0 |
| | 2 | 1.3 | 1.3 |
| | 3 | 1.3 | 1.3 |
| | 4 | 2.7 | 2.7 |
| | 5 | 1.4 | 1.4 |
| | 6 | 2.3 | 2.3 |
| | 7 | 0.2 | 0.2 |
| | 8 | 0.2 | 0.2 |
| IC27 | 9 | 5.1 | 5.1 |
| | 10 | 5.1 | 5.1 |
| | 11 | 3.1 | 3.1 |
| | 12 | 4.2 | 4.2 |
| | 13 | 3.9 | 3.9 |
| | 14 | 3.1 | 3.1 |
| | 15 | 0.7 | 0.7 |
| | 16 | 5.1 | 5.1 |
| IC28 | 1 | 0.0 | 0.0 |
| | 2 | 0.3 | 0.3 |
| | 3 | 0.3 | 0.3 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.7 | 0.7 |
| | 6 | 3.8 | 3.8 |
| | 7 | 0.0 | 0.0 |
| | 8 | 5.1 | 5.1 |
| **TRANSISTOR** | | | |
| Q1 | B | 3.0 | 0.0 |
| | C | 5.1 | 5.1 |
| | E | 2.3 | 0.0 |
| Q2 | B | 0.0 | 5.0 |
| | C | 2.3 | 0.0 |
| | E | 0.0 | 0.0 |
| Q3 | B | 1.2 | 3.2 |
| | C | 5.1 | 5.1 |
| | E | 1.7 | 2.7 |
| Q4 | B | -0.2 | 0.6 |
| | C | 2.1 | 2.3 |
| | E | 0.0 | 0.0 |
| Q5 | B | 4.7 | 4.7 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q6 | B | 0.2 | 0.0 |
| | C | 1.6 | 0.0 |
| | E | 0.0 | 0.0 |
| Q7 | B | 0.0 | 0.0 |
| | C | 12.4 | 12.4 |
| | E | 0.0 | 0.0 |
| Q8 | B | 0.2 | 0.0 |
| | C | 2.0 | 3.2 |
| | E | 0.0 | 0.0 |
| Q9 | B | 0.3 | 0.0 |
| | C | 5.1 | 5.1 |
| | E | 0.0 | 0.0 |
| **CONNECTOR** | | | |
| CN1 | 1 | 12.1 | 0.4 |
| | 2 | 0.0 | 0.0 |
| | 3 | 2.6 | 1.3 |
| | 4 | 0.0 | -0.1 |
| | 5 | 0.0 | 3.6 |
| CN2 | 1 | 5.1 | 5.1 |
| | 2 | 5.0 | 5.0 |
| | 3 | 2.5 | 2.5 |
| | 4 | 0.0 | 0.0 |
| | 5 | 2.5 | 2.5 |
| CN3 | 1 | 3.0 | 3.7 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.8 | 0.1 |
| | 4 | 5.1 | 5.1 |
| | 5 | 5.1 | 4.6 |
| | 6 | 4.6 | 2.6 |
| CN3 | 7 | 0.0 | 0.0 |
| | 8 | 0.0 | 0.0 |
| | 9 | 5.0 | 0.0 |
| | 10 | 2.5 | 2.5 |
| | 11 | 0.0 | 0.0 |
| | 12 | 1.5 | 2.5 |
| | 13 | 5.1 | 5.1 |
| | 14 | 5.0 | 0.0 |
| | 15 | 0.6 | 0.2 |
| | 16 | 0.0 | 0.1 |
| | 17 | 0.3 | 12.5 |
| | 18 | 0.0 | 0.0 |
| | 19 | 0.9 | 0.1 |
| | 20 | 0.0 | 0.0 |
| CN4 | 1 | 3.8 | 4.8 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 12.4 | 12.4 |
| | 6 | 0.0 | 0.0 |
| | 7 | 12.2 | 0.0 |
| | 8 | 0.0 | -0.1 |
| | 9 | 4.4 | 3.7 |
| | 10 | 3.4 | 3.6 |
| | 11 | 5.1 | 5.1 |
| | 12 | 0.0 | 0.0 |
| | 13 | 2.7 | 5.1 |
| | 14 | 4.1 | 0.8 |
| | 15 | 0.0 | 0.0 |
| | 16 | 0.0 | 0.0 |
| | 17 | 0.0 | 0.0 |
| | 18 | 0.2 | 4.8 |
| | 19 | 0.0 | 2.4 |
| | 20 | 0.0 | 3.6 |
| CN5 | 1 | 0.5 | 5.1 |
| | 2 | 4.8 | 5.1 |
| | 3 | 0.6 | 0.2 |
| | 4 | 0.0 | 0.0 |

## 4.17 TIME LAPSE SERVO CIRCUIT BOARD

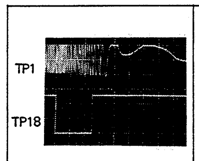
— Solder side —


06
PRK10103 TLS. PWB
PRK10103 A TLS. PWB ASS'Y
ICP-F38
ICP1
CN3
CN4
CN1
CN2
CN5
GND

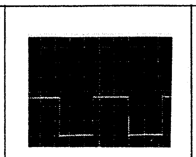
— Parts side —


IC23
IC24
IC25
IC27
IC21
IC16
IC18
IC19
IC17
IC13
IC12
IC15
IC10
IC11
IC7
IC8
IC2
IC1
IC3
IC9
IC4
CN4
CN3
ICP-F38
ICP1
TH1
X1

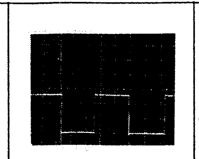
– MAIN WAVEFORMS OF TIME LAPSE SERVO CIRCUIT –



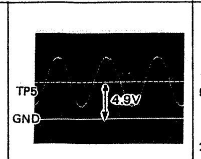
TP1 2.0 Vp-p
TP18
PB, TL 24H



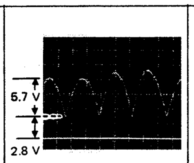
TP3
5.1 Vp-p
REC, SP



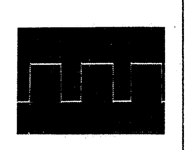
TP4
5.1 Vp-p
REC, SP



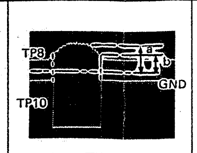
TP20
6.6 Vp-p
REC, SP



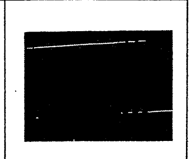
TP6
5.7 Vp-p
REC, SP



TP7
5.1 Vp-p
REC, SP

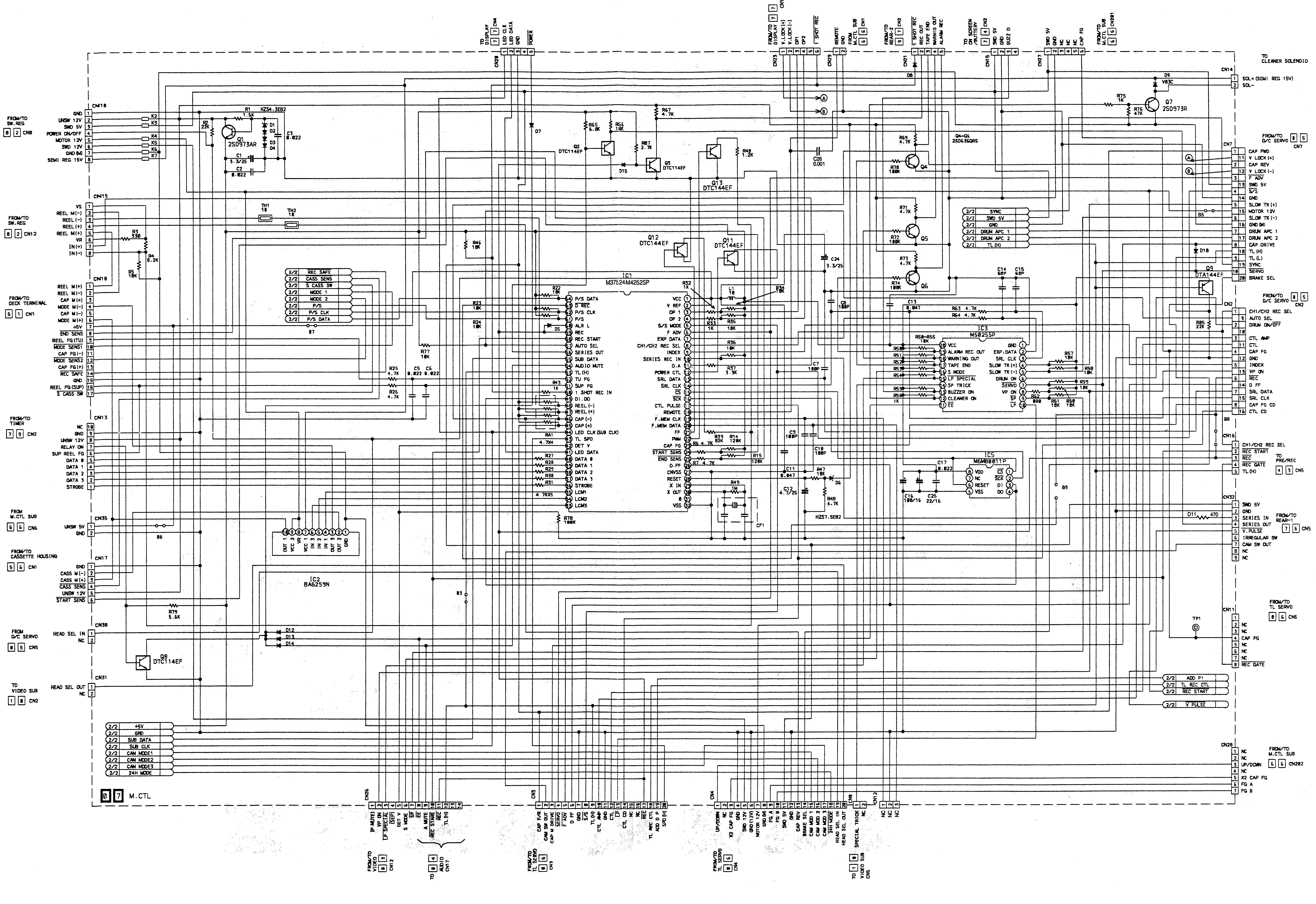


TP8
a=3.3 V, b= 1.5 V
TP10
REC, TL 24H



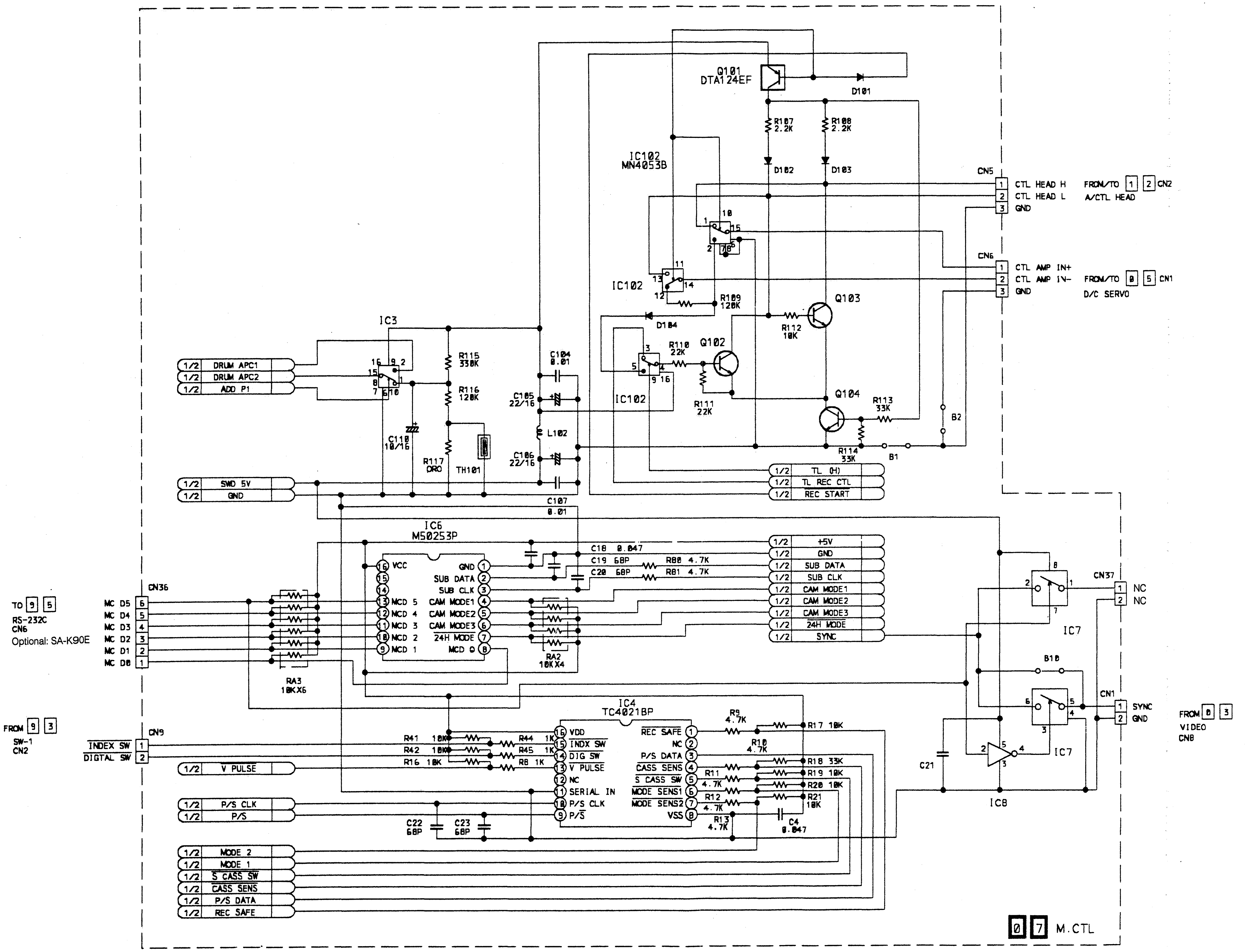
TP11
5.0 Vp-p
REC, TL 24H

# 4.18 MECHACON SCHEMATIC DIAGRAM (1/2)



IC1 M37524M4252SP
IC2 BA6259N
IC3 M50255P
IC5 MBM88011P
Q1 2SD973AR
Q2 DTC114EF
Q3 DTC114EF
Q4–Q6 2SD636QRS
Q7 2SD973R
Q8 DTC114EF
Q9 DTA144EF
Q11 DTC144EF
Q12 DTC144EF
Q13 DTC144EF
FROM/TO SW.REG 8 2 CN8
FROM/TO SW.REG 8 2 CN12
FROM/TO DECK TERMINAL 5 1 CN1
FROM/TO TIMER 7 9 CN2
FROM M.CTL SUB 6 6 CN6
FROM/TO CASSETTE HOUSING 5 6 CN1
FROM D/C SERVO 8 5 CN5
TO VIDEO SUB 1 8 CN2
TO CLEANER SOLENOID
FROM/TO D/C SERVO 8 5 CN7
FROM/TO D/C SERVO 8 5 CN2
TO PRE/REC 4 3 CN5
FROM/TO REAR-1 7 6 CN5
FROM/TO TL SERVO 8 6 CN5
FROM/TO M.CTL SUB 6 6 CN202
TO DISPLAY 7 7 CN4
FROM/TO DISPLAY 7 7 CN11
FROM M.CTL SUB 6 6 CN1
FROM/TO REAR-2 9 7 CN2
TO SCREEN /BATTERY 7 4 CN2
FROM/TO M.CTL SUB 6 6 CN201
FROM/TO VIDEO 8 3 CN12
TO 8 4 AUDIO CN17
FROM/TO TL SERVO 8 6 CN3
FROM/TO TL SERVO 8 6 CN4
TO 1 8 VIDEO SUB CN5
0 7 M.CTL

## — MECHACON SCHEMATIC DIAGRAM (2/2) —


Q101
DTA124EF
D101
R107 2.2K
R108 2.2K
D102
D103
IC102
MN4053B
CN5
1 CTL HEAD H
2 CTL HEAD L
3 GND
FROM/TO 1 2 CN2
A/CTL HEAD
CN6
1 CTL AMP IN+
2 CTL AMP IN-
3 GND
FROM/TO 0 5 CN1
D/C SERVO
IC102
R109 120K
Q103
D104
R112 10K
R110 22K
Q102
IC102
R111 22K
Q104
R113 33K
B2
R114 33K
B1
IC3
R115 330K
R116 120K
C104 0.01
C105 22/16
L102
C106 22/16
C110 10/16
R117 ORO
TH101
C107 0.01
1/2 DRUM APC1
1/2 DRUM APC2
1/2 ADD P1
1/2 SWD 5V
1/2 GND
1/2 TL (H)
1/2 TL REC CTL
1/2 REC START
IC6
M50253P
VCC
GND
SUB DATA
SUB CLK
MCD 5
MCD 4
MCD 3
MCD 2
MCD 1
CAM MODE1
CAM MODE2
CAM MODE3
24H MODE
MCD Q
C18 0.047
C19 68P
C20 68P
R80 4.7K
R81 4.7K
1/2 +5V
1/2 GND
1/2 SUB DATA
1/2 SUB CLK
1/2 CAM MODE1
1/2 CAM MODE2
1/2 CAM MODE3
1/2 24H MODE
1/2 SYNC
RA2 10KX4
RA3 10KX6
CN36
TO 9 5
RS-232C
CN6
Optional: SA-K90E
MC D5 6
MC D4 5
MC D3 4
MC D2 3
MC D1 2
MC D0 1
CN37
1 NC
2 NC
IC7
B10
CN1
1 SYNC
2 GND
FROM 0 3
VIDEO
CN8
IC7
C21
IC8
IC4
TC4021BP
VDD
INDX SW
DIG SW
V PULSE
NC
SERIAL IN
P/S CLK
P/S
REC SAFE
NC
P/S DATA
CASS SENS
S CASS SW
MODE SENS1
MODE SENS2
VSS
R9 4.7K
R17 10K
R10 4.7K
R18 33K
R19 10K
R20 10K
R21 10K
R11 4.7K
R12 4.7K
R13 4.7K
C4 0.047
R41 10K
R42 10K
R16 10K
R44 1K
R45 1K
R8 1K
FROM 9 3
SW-1
CN2
CN9
INDEX SW 1
DIGTAL SW 2
1/2 V PULSE
1/2 P/S CLK
1/2 P/S
C22 68P
C23 68P
1/2 MODE 2
1/2 MODE 1
1/2 S CASS SW
1/2 CASS SENS
1/2 P/S DATA
1/2 REC SAFE
0 7 M.CTL

| | 9020E |
|---|---|
| CN12 | × |
| CN36 | × |
| CN37 | × |
| B8 | ○ |
| B9 | × |
| B10 | ○ |
| IC7 | × |
| IC8 | × |
| C21 | × |

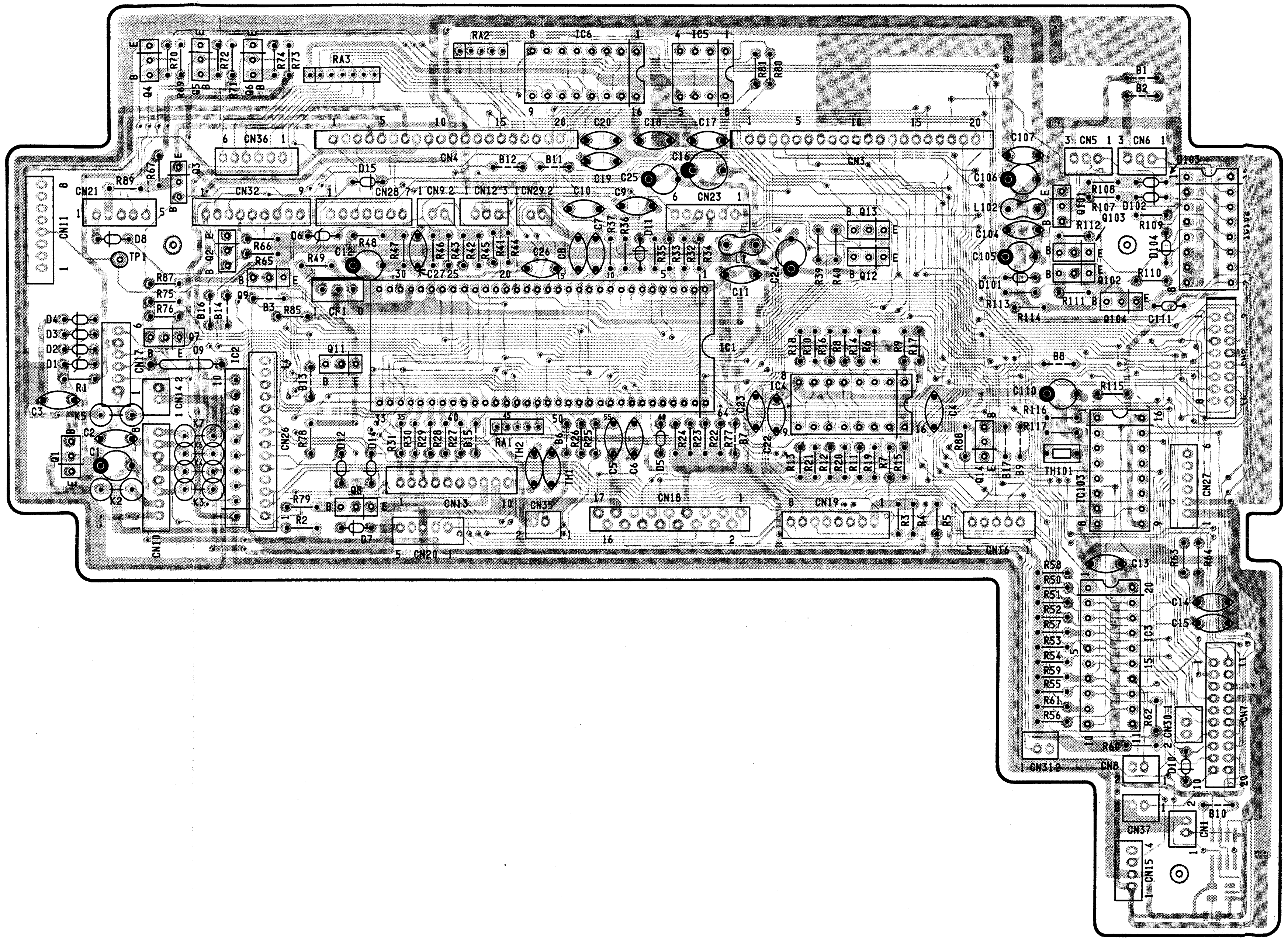
X are not used.

# 4.19 MECHACON CIRCUIT BOARD

## — MECHACON Voltage (1/2) —

| Symbol | No. | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC1 | 1 | 5.1 | 5.2 |
| | 2 | 5.1 | 5.2 |
| | 3 | 5.1 | 5.2 |
| | 4 | 5.1 | 5.2 |
| | 5 | 5.1 | 5.2 |
| | 6 | 5.1 | 5.2 |
| | 7 | 0.1 | 0.1 |
| | 8 | 5.1 | 5.2 |
| | 9 | 0.0 | 0.1 |
| | 10 | 5.1 | 5.2 |
| | 11 | 1.9 | 2.0 |
| | 12 | 5.1 | 5.2 |
| | 13 | 0.0 | 0.1 |
| | 14 | 0.2 | 0.3 |
| | 15 | 0.0 | 0.1 |
| | 16 | 5.1 | 5.2 |
| | 17 | 4.9 | 1.9 |
| | 18 | 5.7 | 5.7 |
| | 19 | 0.1 | 0.2 |
| | 20 | 0.1 | 0.1 |
| | 21 | 0.0 | 0.1 |
| | 22 | 0.0 | 0.1 |
| | 23 | 2.5 | 2.5 |
| | 24 | 5.1 | 5.2 |
| | 25 | 5.1 | 5.2 |
| | 26 | 5.1 | 5.2 |
| | 27 | 0.0 | 0.1 |
| | 28 | 5.4 | 5.4 |
| | 29 | 3.1 | 3.1 |
| | 30 | 1.7 | 1.8 |
| | 31 | 5.1 | 5.1 |
| | 32 | 0.0 | 0.1 |
| | 33 | 0.0 | 0.1 |
| | 34 | 0.0 | 0.1 |
| | 35 | 0.0 | 0.1 |
| | 36 | 2.2 | 2.3 |
| | 37 | 0.6 | 0.4 |
| | 38 | 1.0 | 1.3 |
| | 39 | 1.1 | 1.0 |
| | 40 | 1.3 | 0.7 |
| | 41 | 0.1 | 0.2 |
| | 42 | 5.3 | 0.1 |
| | 43 | 0.0 | 0.1 |
| | 44 | 0.2 | 0.2 |
| | 45 | 0.1 | 0.1 |
| | 46 | 5.1 | 5.1 |
| | 47 | 0.1 | 5.1 |
| | 48 | 4.1 | 4.2 |
| | 49 | 0.0 | 0.1 |
| | 50 | 5.1 | 5.2 |
| | 51 | 4.2 | 4.4 |
| | 52 | 4.2 | -0.2 |
| | 53 | 0.0 | 0.1 |
| | 54 | 0.1 | 0.1 |
| | 55 | 0.1 | 0.1 |
| | 56 | 0.1 | 0.1 |
| | 57 | 0.1 | 0.1 |
| | 58 | 0.1 | 5.2 |
| | 59 | 0.3 | 12.6 |
| | 60 | 0.3 | 12.3 |
| | 61 | 0.1 | 0.1 |
| | 62 | 0.1 | 0.1 |
| | 63 | 0.0 | 0.1 |
| | 64 | 5.1 | 5.2 |
| IC2 | 1 | 0.0 | 0.0 |
| | 2 | 11.0 | 10.3 |
| | 3 | 10.2 | 11.2 |
| | 4 | 0.1 | 0.1 |
| | 5 | 0.1 | 0.1 |
| | 6 | 0.1 | 0.1 |
| | 7 | 15.6 | 15.7 |
| | 8 | 12.3 | 12.5 |
| IC2 | 9 | 12.3 | 12.5 |
| | 10 | 10.7 | 10.4 |
| IC3 | 1 | 0.0 | 0.1 |
| | 2 | 0.1 | 0.1 |
| | 3 | 0.2 | 0.3 |
| | 4 | 5.1 | 5.2 |
| | 5 | 5.1 | 5.2 |
| | 6 | 4.5 | 4.6 |
| | 7 | 5.1 | 5.2 |
| | 8 | 0.1 | 0.1 |
| | 9 | 0.0 | 0.1 |
| | 10 | 5.0 | 5.1 |
| | 11 | 0.0 | 6.0 |
| | 12 | 0.2 | 0.3 |
| | 13 | 0.0 | 0.1 |
| | 14 | 0.0 | 0.1 |
| | 15 | 5.1 | 5.2 |
| | 16 | 0.0 | 0.1 |
| | 17 | 0.0 | 0.1 |
| | 18 | 4.7 | 4.8 |
| | 19 | 4.7 | 4.8 |
| | 20 | 5.1 | 5.2 |
| IC4 | 1 | 0.0 | 5.1 |
| | 2 | 0.1 | 0.1 |
| | 3 | 5.1 | 5.1 |
| | 4 | 0.1 | 0.1 |
| | 5 | 5.1 | 5.1 |
| | 6 | 5.1 | 5.1 |
| | 7 | 5.1 | 5.1 |
| | 8 | 0.0 | 0.0 |
| | 9 | 0.1 | 0.0 |
| | 10 | 0.1 | 0.1 |
| | 11 | 0.0 | 0.0 |
| | 12 | 0.1 | 0.1 |
| | 13 | 5.1 | 5.1 |
| | 14 | 5.0 | 5.1 |
| | 15 | 5.0 | 5.0 |
| | 16 | 5.1 | 5.1 |
| IC5 | 1 | 0.0 | 0.0 |
| | 2 | 5.1 | 5.1 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 5.1 | 5.1 |
| | 8 | 5.1 | 5.1 |
| IC6 | 1 | 0.0 | 0.0 |
| | 2 | 0.1 | 0.0 |
| | 3 | 0.2 | 0.2 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 4.8 | 4.8 |
| | 8 | 5.1 | 5.1 |
| | 9 | 0.0 | 0.0 |
| | 10 | 0.0 | 0.0 |
| | 11 | 0.0 | 0.0 |
| | 12 | 0.0 | 0.0 |
| | 13 | 0.0 | 5.1 |
| | 14 | 0.0 | 0.0 |
| | 15 | 0.0 | 0.0 |
| | 16 | 5.1 | 5.1 |
| IC7 | 1 | 0.5 | 0.5 |
| | 2 | 1.3 | 0.5 |
| | 3 | 5.1 | 0.1 |
| | 4 | 0.1 | 0.1 |
| | 5 | 1.3 | 0.4 |
| | 6 | 1.3 | 0.5 |
| | 7 | 0.1 | 5.1 |
| | 8 | 0.2 | 5.1 |
| IC8 | 1 | . | . |
| | 2 | . | . |
| | 3 | . | . |
| | 4 | . | . |
| | 5 | . | . |
| IC102 | 1 | 0.6 | 2.5 |
| | 2 | 2.9 | 0.2 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 2.1 |
| | 5 | 0.0 | 2.1 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| | 8 | 0.0 | 0.0 |
| | 9 | 0.1 | 0.1 |
| | 10 | 0.6 | 5.1 |
| | 11 | 0.6 | 5.1 |
| | 12 | 1.9 | 4.7 |
| | 13 | . | . |
| | 14 | . | . |
| | 15 | . | . |
| | 16 | . | . |
| IC103 | 1 | 1.3 | 1.4 |
| | 2 | 2.5 | 2.5 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.1 | 0.0 |
| | 5 | 0.1 | 0.0 |
| | 6 | 0.0 | 0.1 |
| | 7 | 0.0 | 0.1 |
| | 8 | 0.0 | 0.1 |
| | 9 | 0.1 | 5.1 |
| | 10 | 0.1 | 0.1 |
| | 11 | 0.1 | 0.3 |
| | 12 | 0.1 | 0.3 |
| | 13 | 0.1 | 0.3 |
| | 14 | 0.1 | 0.4 |
| | 15 | 2.4 | 2.5 |
| | 16 | 5.0 | 5.1 |
| **TRANSISTOR** | | | |
| Q1 | B | 5.8 | 5.8 |
| | C | 12.6 | 12.6 |
| | E | 5.2 | 5.2 |
| Q2 | B | 0.1 | 0.1 |
| | C | 5.2 | 5.2 |
| | E | 0.1 | 0.1 |
| Q3 | B | 1.0 | 4.2 |
| | C | 12.5 | 0.1 |
| | E | 0.1 | 0.1 |
| Q4 | B | 0.1 | 0.1 |
| | C | 12.6 | 12.6 |
| | E | 0.1 | 0.1 |
| Q5 | B | 0.7 | 0.7 |
| | C | 0.1 | 0.1 |
| | E | 0.1 | 0.1 |
| Q6 | B | 0.7 | 0.7 |
| | C | 0.1 | 0.1 |
| | E | 0.1 | 0.1 |
| Q7 | B | 0.2 | 0.2 |
| | C | 15.6 | 15.6 |
| | E | 0.0 | 0.0 |
| Q8 | B | 0.5 | 0.5 |
| | C | 0.6 | 5.7 |
| | E | 0.1 | 0.1 |
| Q9 | B | 0.1 | 0.1 |
| | C | 5.2 | 5.2 |
| | E | 5.2 | 5.2 |
| Q11 | B | 5.2 | 5.2 |
| | C | 0.1 | 0.1 |
| | E | 0.1 | 0.1 |
| Q12 | B | 0.1 | 0.1 |
| | C | 2.0 | 2.0 |
| | E | 0.1 | 0.1 |
| Q13 | B | 0.1 | 0.1 |
| | C | 2.0 | 2.0 |
| | E | 0.1 | 0.1 |
| Q101 | B | . | . |
| | C | . | . |
| | E | . | . |
| Q102 | B | 0.5 | 2.2 |
| | C | 0.5 | 2.5 |
| | E | 0.1 | 2.2 |
| Q103 | B | 0.4 | 2.5 |
| | C | 0.6 | 2.6 |
| | E | 0.1 | 2.2 |
| Q104 | B | 0.7 | 0.1 |
| | C | 0.1 | 2.2 |
| | E | 0.1 | 0.1 |
| **CONNECTOR** | | | |
| CN1 | 1 | 1.2 | 1.3 |
| | 2 | 0.0 | 0.0 |
| CN2 | 1 | 5.2 | 5.2 |
| | 2 | 4.6 | 4.6 |
| | 3 | 2.5 | 2.5 |
| | 4 | 0.4 | 0.4 |
| | 5 | 0.1 | 0.1 |
| | 6 | 0.1 | 0.1 |
| | 7 | 0.1 | 0.1 |
| | 8 | 2.5 | 2.5 |
| | 9 | 0.1 | 0.1 |
| | 10 | 2.5 | 2.5 |
| | 11 | 2.5 | 2.5 |
| | 12 | 0.1 | 0.1 |
| | 13 | 0.1 | 0.1 |
| | 14 | 0.1 | 0.1 |
| | 15 | 0.3 | 0.3 |
| | 16 | 5.0 | 5.0 |
| CN3 | 1 | 0.1 | 0.1 |
| | 2 | 0.2 | 0.1 |
| | 3 | 3.2 | 3.2 |
| | 4 | 5.1 | 5.1 |
| | 5 | 5.1 | 5.1 |
| | 6 | 2.6 | 2.6 |
| | 7 | 0.0 | 0.0 |
| | 8 | 5.1 | 5.1 |
| | 9 | 0.0 | 0.0 |
| | 10 | 2.5 | 2.5 |
| | 11 | 0.0 | 0.0 |
| | 12 | 2.5 | 2.5 |
| | 13 | 5.0 | 5.1 |
| | 14 | 5.0 | 1.9 |
| | 15 | 0.1 | 0.1 |
| | 16 | 0.1 | 0.2 |
| | 17 | 0.3 | 12.5 |
| | 18 | 0.0 | 0.0 |
| | 19 | 0.1 | 0.1 |
| | 20 | 0.0 | 0.0 |

— Parts side —


IC6
IC5
IC1
IC2
IC3
IC4
IC103
RA1
RA2
RA3
CN1
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
CN12
CN13
CN14
CN15
CN16
CN17
CN18
CN19
CN20
CN21
CN23
CN26
CN27
CN28
CN29
CN30
CN31
CN32
CN35
CN36
CN37
Q1
Q2
Q3
Q4
Q5
Q6
Q8
Q11
Q12
Q13
Q14
Q102
Q103
Q104
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D15
D101
D102
D103
D104
TP1
TH101
L102
CF1
K1
K2
K3
K5

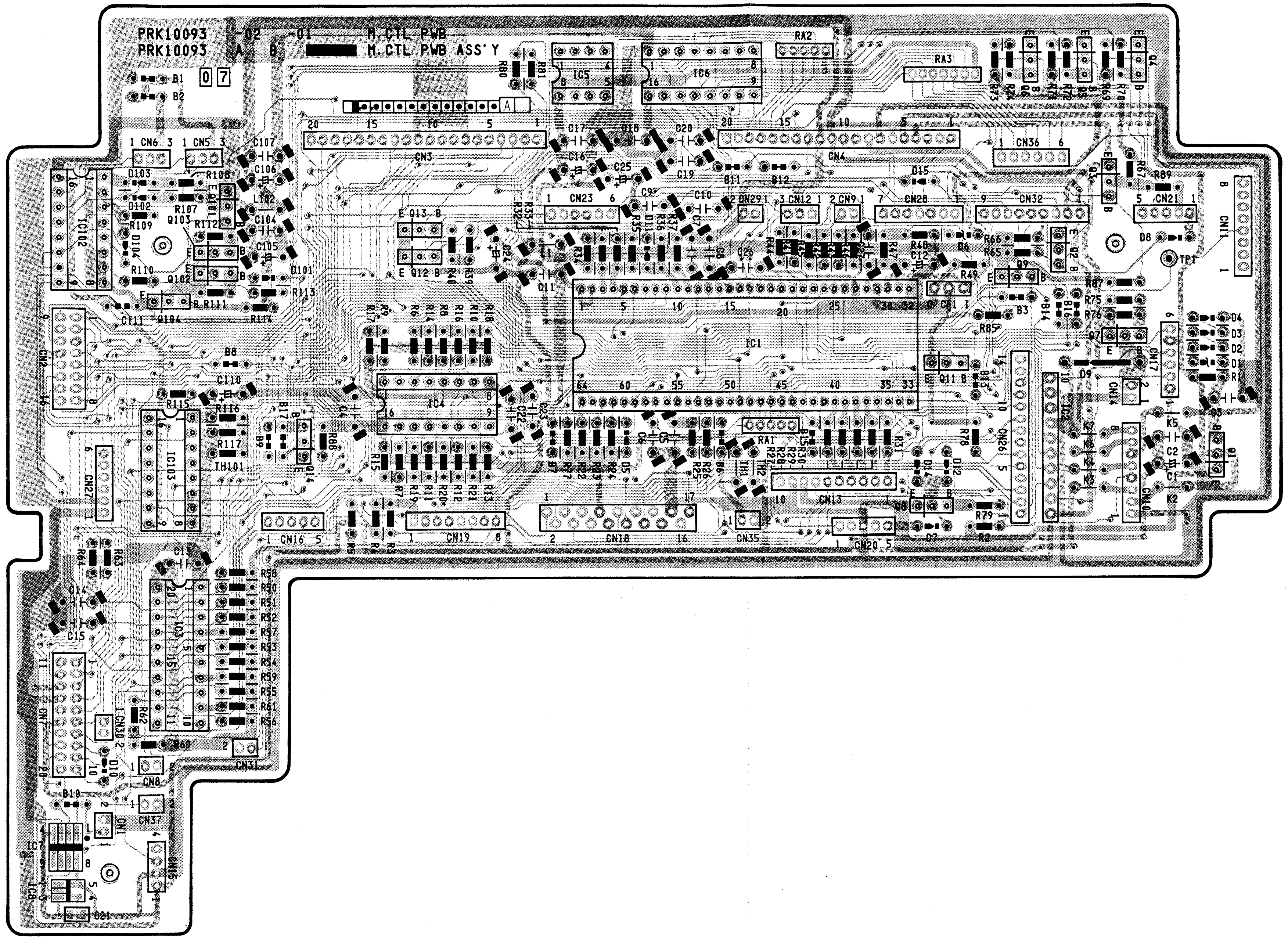
## — MECHACON Voltage (2/2) —

| Symbol No. | | REC | PB |
|---|---|---|---|
| CN4 | 1 | 0.3 | 0.3 |
| | 2 | 0.2 | 0.2 |
| | 3 | 0.1 | 0.1 |
| | 4 | 0.0 | 0.0 |
| | 5 | 12.4 | 12.4 |
| | 6 | 0.0 | 0.0 |
| | 7 | 12.2 | 12.2 |
| | 8 | 0.0 | 0.0 |
| | 9 | 2.6 | 2.6 |
| | 10 | 2.6 | 2.5 |
| | 11 | 5.1 | 5.1 |
| | 12 | 0.0 | 0.0 |
| | 13 | 5.1 | 5.1 |
| | 14 | 0.1 | 0.1 |
| | 15 | 0.0 | 0.0 |
| | 16 | 0.0 | 0.0 |
| | 17 | 0.0 | 0.0 |
| | 18 | 4.8 | 4.8 |
| | 19 | 0.0 | 0.0 |
| | 20 | 0.0 | 0.0 |
| CN5 | 1 | 0.6 | 2.5 |
| | 2 | 0.4 | 2.5 |
| | 3 | 0.0 | 0.0 |
| CN6 | 1 | 3.1 | 2.5 |
| | 2 | 0.1 | 2.5 |
| | 3 | 0.0 | 0.0 |
| CN7 | 1 | 0.1 | 0.1 |
| | 2 | 5.1 | 5.1 |
| | 3 | 5.2 | 5.2 |
| | 4 | 5.2 | 5.2 |
| | 5 | 5.2 | 5.2 |
| | 6 | 5.2 | 5.2 |
| | 7 | 2.5 | 2.5 |
| | 8 | 3.2 | 3.2 |
| | 9 | 5.1 | 0.2 |
| | 10 | 5.2 | 5.2 |
| | 11 | 0.8 | 0.7 |
| | 12 | 0.8 | 0.7 |
| | 13 | 5.1 | 5.1 |
| | 14 | 0.1 | 0.1 |
| | 15 | 0.7 | 0.3 |
| | 16 | 0.0 | 0.0 |
| | 17 | 2.5 | 2.5 |
| | 18 | 0.1 | 0.1 |
| | 19 | 1.3 | 0.5 |
| | 20 | 0.5 | 0.6 |
| CN8 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| CN9 | 1 | 5.1 | 5.1 |
| | 2 | 5.1 | 5.1 |
| CN10 | 1 | 0.0 | 0.1 |
| | 2 | 12.5 | 12.6 |
| | 3 | 5.1 | 5.1 |
| | 4 | 0.0 | 0.1 |
| | 5 | 12.2 | 12.5 |
| | 6 | 12.4 | 12.4 |
| | 7 | 0.0 | 0.0 |
| | 8 | 15.6 | 15.6 |
| CN11 | 1 | — | — |
| | 2 | — | — |
| | 3 | — | — |
| | 4 | 0.4 | 0.4 |
| | 5 | — | — |
| | 6 | — | — |
| | 7 | — | — |
| | 8 | 5.1 | 5.1 |

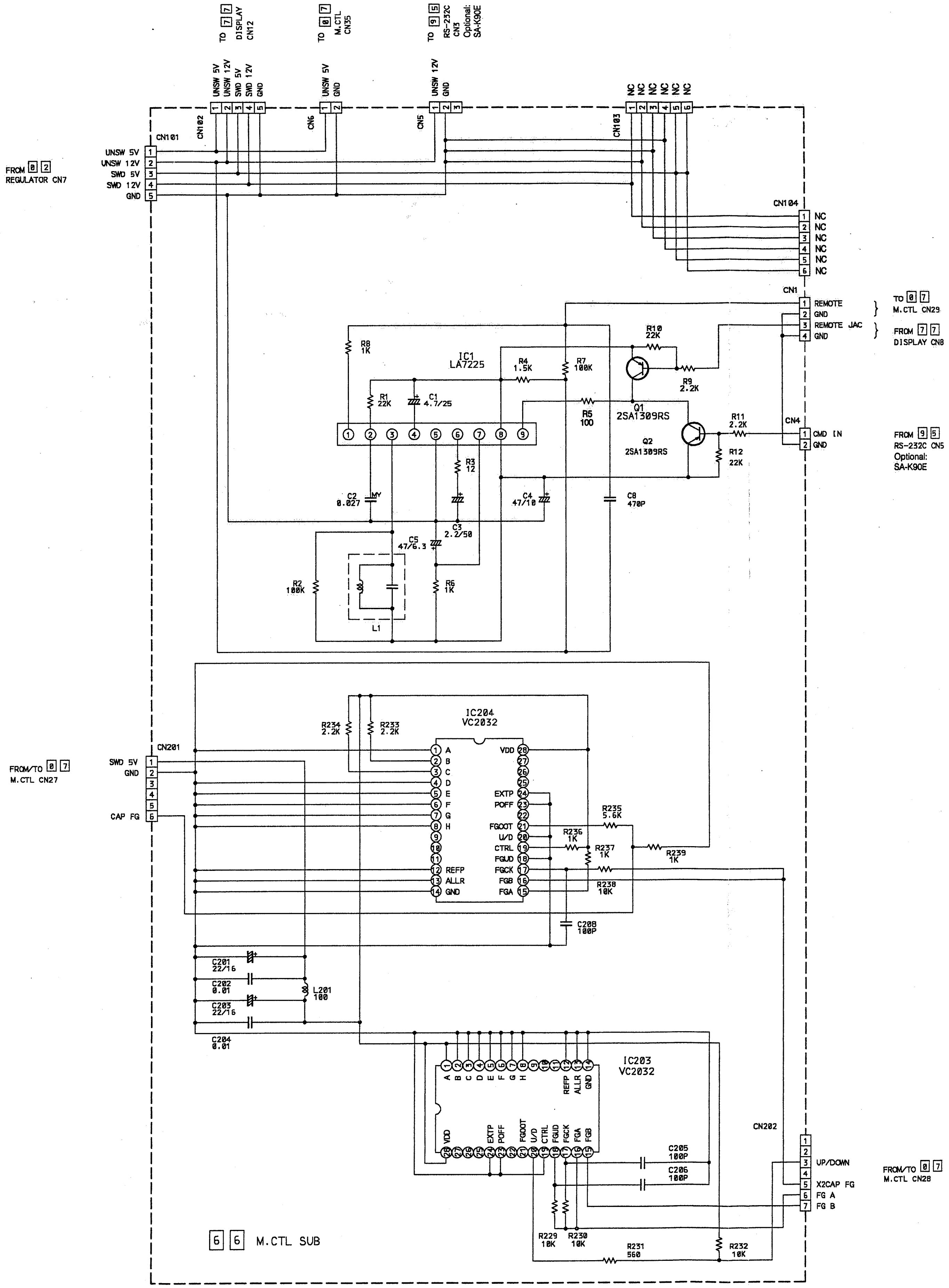
| Symbol No. | | REC | PB |
|---|---|---|---|
| CN12 | 1 | 0.1 | 0.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.1 | 0.1 |
| CN13 | 1 | 2.2 | 2.3 |
| | 2 | 0.6 | 0.6 |
| | 3 | 1.0 | 1.4 |
| | 4 | 1.2 | 1.1 |
| | 5 | 1.3 | 1.0 |
| | 6 | 1.2 | 4.4 |
| | 7 | 0.5 | 0.5 |
| | 8 | 12.5 | 12.6 |
| | 9 | 0.0 | 0.1 |
| | 10 | — | — |
| CN14 | 1 | 15.6 | 15.6 |
| | 2 | 15.6 | 15.6 |
| CN15 | 1 | 5.1 | 5.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | — | — |
| CN16 | 1 | 5.1 | 5.1 |
| | 2 | 0.1 | 5.1 |
| | 3 | 0.3 | 12.5 |
| | 4 | 5.1 | 5.1 |
| | 5 | 0.0 | 0.0 |
| CN17 | 1 | 0.0 | 0.1 |
| | 2 | 10.3 | 11.1 |
| | 3 | 10.7 | 10.2 |
| | 4 | 0.1 | 0.1 |
| | 5 | 12.5 | 12.6 |
| | 6 | 5.1 | 5.1 |
| CN18 | 1 | 2.4 | 2.4 |
| | 2 | 0.1 | 0.1 |
| | 3 | 0.2 | 0.2 |
| | 4 | 11.2 | 11.2 |
| | 5 | 0.0 | 0.1 |
| | 6 | 11.4 | 11.2 |
| | 7 | 5.1 | 5.1 |
| | 8 | 5.1 | 5.1 |
| | 9 | 0.0 | 5.1 |
| | 10 | 5.2 | 5.2 |
| | 11 | 0.0 | 0.0 |
| | 12 | 5.2 | 5.2 |
| | 13 | 0.0 | 0.0 |
| | 14 | 0.1 | 5.2 |
| | 15 | 0.1 | 0.1 |
| | 16 | 4.3 | 4.4 |
| | 17 | 5.2 | 5.2 |
| CN19 | 1 | 3.7 | 3.7 |
| | 2 | 0.1 | 0.1 |
| | 3 | 4.1 | 4.2 |
| | 4 | 0.1 | 0.1 |
| | 5 | 2.3 | 2.4 |
| | 6 | 3.6 | 3.7 |
| | 7 | 1.9 | 2.0 |
| | 8 | 2.0 | 2.1 |
| CN20 | 1 | 0.2 | 0.2 |
| | 2 | 0.1 | 0.1 |
| | 3 | 0.0 | 0.1 |
| | 4 | — | — |
| | 5 | 0.3 | 0.4 |
| CN21 | 1 | 4.9 | 4.9 |
| | 2 | 12.4 | 0.0 |
| | 3 | 12.5 | 12.5 |
| | 4 | 0.1 | 0.1 |
| | 5 | 0.1 | 0.1 |

| Symbol No. | | REC | PB |
|---|---|---|---|
| CN23 | 1 | 0.7 | 0.6 |
| | 2 | 0.7 | 2.9 |
| | 3 | 5.1 | 5.1 |
| | 4 | 5.1 | 5.1 |
| | 5 | — | — |
| | 6 | — | — |
| CN26 | 1 | 0.2 | -0.2 |
| | 2 | 0.1 | 0.1 |
| | 3 | 5.1 | 5.2 |
| | 4 | 0.0 | 0.0 |
| | 5 | 5.3 | 0.1 |
| | 6 | 0.0 | 0.1 |
| | 7 | 0.0 | 0.1 |
| | 8 | 0.0 | 6.0 |
| | 9 | 0.1 | 0.1 |
| | 10 | 0.1 | 5.2 |
| | 11 | 0.3 | 12.6 |
| | 12 | 0.0 | 0.1 |
| | 13 | — | 0.1 |
| | 14 | — | 0.1 |
| CN27 | 1 | 5.1 | 5.1 |
| | 2 | 0.1 | 0.0 |
| | 3 | 5.2 | 5.1 |
| | 4 | 0.1 | 0.1 |
| | 5 | 5.0 | 1.5 |
| | 6 | 0.4 | 0.4 |
| CN28 | 1 | 0.2 | 0.3 |
| | 2 | 0.2 | 0.1 |
| | 3 | 0.3 | 0.3 |
| | 4 | 0.2 | 0.2 |
| | 5 | 0.1 | 0.1 |
| | 6 | 2.6 | 2.6 |
| | 7 | 2.5 | 2.5 |
| CN29 | 1 | 5.7 | 5.7 |
| | 2 | 0.0 | 0.0 |
| CN30 | 1 | 0.1 | 0.0 |
| | 2 | — | — |
| CN31 | 1 | 0.0 | 0.0 |
| | 2 | — | |
| CN32 | 1 | 5.1 | 5.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 4.9 | 4.9 |
| | 4 | 5.1 | 5.1 |
| | 5 | 5.1 | 5.1 |
| | 6 | 5.0 | 5.1 |
| | 7 | 0.2 | 5.1 |
| | 8 | 5.0 | 5.1 |
| | 9 | 5.0 | 5.1 |
| CN35 | 1 | 5.0 | 5.1 |
| | 2 | 0.0 | 5.1 |
| CN36 | 1 | 5.1 | 5.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 5.1 |
| CN37 | 1 | 0.4 | 0.4 |
| | 2 | 0.0 | 0.0 |

— Solder side —


PRK10093 -02 -01 M.CTL PWB
PRK10093 A B M.CTL PWB ASS'Y
IC1
IC4
IC5
IC6
IC102
IC103
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
CN12
CN13
CN14
CN15
CN16
CN17
CN18
CN19
CN20
CN21
CN23
CN26
CN27
CN28
CN29
CN30
CN31
CN32
CN35
CN36
CN37
TP1

## 4.20 MECHACON SUB SCHEMATIC DIAGRAM


TO 7 7 DISPLAY CN12
TO 8 7 M.CTL CN35
TO 9 5 RS-232C CN3 Optional: SA-K90E
UNSW 5V
UNSW 12V
SWD 5V
SWD 12V
GND
NC
FROM 8 2 REGULATOR CN7
CN101
CN102
CN6
CN5
CN103
CN104
CN1
REMOTE
REMOTE JAC
TO 8 7 M.CTL CN29
FROM 7 7 DISPLAY CN8
CN4
CMD IN
FROM 9 5 RS-232C CN5 Optional: SA-K90E
IC1 LA7225
R8 1K
R1 22K
C1 4.7/25
R4 1.5K
R7 100K
R10 22K
R9 2.2K
Q1 2SA1309RS
Q2 2SA1309RS
R5 100
R11 2.2K
R12 22K
R3 12
C2 0.027
C4 47/10
C8 470P
C5 47/6.3
C3 2.2/50
R2 100K
R6 1K
L1
FROM/TO 8 7 M.CTL CN27
CN201
CAP FG
IC204 VC2032
R234 2.2K
R233 2.2K
A
B
C
D
E
F
G
H
REFP
ALLR
GND
VDD
EXTP
POFF
FGOOT
U/D
CTRL
FGUD
FGCK
FGB
FGA
R235 5.6K
R236 1K
R237 1K
R239 1K
R238 10K
C208 100P
C201 22/16
C202 0.01
L201 100
C203 22/16
C204 0.01
IC203 VC2032
C205 100P
C206 100P
CN202
UP/DOWN
X2CAP FG
FG A
FG B
FROM/TO 8 7 M.CTL CN28
R229 10K
R230 10K
R231 560
R232 10K
6 6 M.CTL SUB

## — MECHACON SUB Voltage —

| SYMBOL | No. | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC1 | 1 | 5.7 | 5.7 |
| | 2 | 5.9 | 5.9 |
| | 3 | 5.9 | 5.9 |
| | 4 | 4.3 | 4.3 |
| | 5 | 0.0 | 0.0 |
| | 6 | 4.4 | 4.4 |
| | 7 | 5.0 | 5.0 |
| | 8 | 5.9 | 5.9 |
| | 9 | 0.0 | 0.0 |
| IC203 | 1 | 5.1 | 5.1 |
| | 2 | 0.1 | 0.1 |
| | 3 | 0.1 | 0.1 |
| | 4 | 0.1 | 0.1 |
| | 5 | 0.1 | 0.1 |
| | 6 | 0.1 | 0.1 |
| | 7 | 0.1 | 0.1 |
| | 8 | 0.1 | 0.1 |
| | 9 | 0.1 | 0.1 |
| | 10 | 0.1 | 0.1 |
| | 11 | 0.1 | 0.1 |
| | 12 | 0.1 | 0.1 |
| | 13 | 0.1 | 0.1 |
| | 14 | 0.1 | 0.1 |
| | 15 | 2.6 | 2.6 |
| | 16 | 2.7 | 2.7 |
| | 17 | 2.7 | 2.7 |
| | 18 | 2.7 | 2.7 |
| | 19 | 0.1 | 0.1 |
| | 20 | 0.1 | 0.1 |
| | 21 | 0.1 | 0.1 |
| | 22 | 0.1 | 0.0 |
| | 23 | 0.1 | 0.1 |
| | 24 | 0.1 | 0.1 |
| | 25 | 0.1 | 0.1 |
| | 26 | 0.1 | 0.1 |
| | 27 | 0.1 | 0.1 |
| | 28 | 5.1 | 5.1 |
| IC204 | 1 | 0.1 | 0.1 |
| | 2 | 5.1 | 5.1 |
| | 3 | 5.1 | 5.1 |
| | 4 | 0.1 | 0.1 |
| | 5 | 0.1 | 0.1 |
| | 6 | 0.1 | 0.1 |
| | 7 | 0.1 | 0.1 |
| | 8 | 0.1 | 0.1 |
| | 9 | 0.0 | 0.0 |
| | 10 | 0.0 | 0.0 |
| | 11 | 0.0 | 0.0 |
| | 12 | 0.1 | 0.1 |
| | 13 | 0.1 | 0.1 |
| | 14 | 0.1 | 0.1 |
| | 15 | 5.1 | 5.1 |
| | 16 | 0.2 | 0.2 |
| | 17 | 0.2 | 0.2 |
| | 18 | 0.1 | 0.1 |
| | 19 | 5.1 | 5.1 |
| | 20 | 0.1 | 0.1 |
| | 21 | 2.6 | 2.6 |
| | 22 | 0.0 | 0.0 |
| | 23 | 0.1 | 0.1 |
| | 24 | 0.1 | 0.1 |
| | 25 | 0.1 | 0.1 |
| | 26 | 0.2 | 0.0 |
| | 27 | 0.2 | 0.0 |
| | 28 | 5.1 | 5.1 |

| SYMBOL | No. | REC | PB |
|---|---|---|---|
| **TRANSISTOR** | | | |
| Q1 | B | 5.9 | 5.9 |
| | C | 0.0 | 0.0 |
| | E | 5.9 | 5.9 |
| Q2 | B | 5.9 | 5.9 |
| | C | 0.0 | 0.0 |
| | E | 5.9 | 5.9 |
| **CONNECTOR** | | | |
| CN1 | 1 | 5.8 | 5.8 |
| | 2 | 0.1 | 0.1 |
| | 3 | 5.9 | 5.9 |
| | 4 | 0.1 | 0.1 |
| CN2 | 1 | 0.1 | 0.1 |
| | 2 | 0.1 | 0.1 |
| | 3 | 0.1 | 0.1 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.1 | 0.1 |
| | 6 | 0.0 | 0.0 |
| CN4 | 1 | 5.9 | 5.9 |
| | 2 | 0.1 | 0.1 |
| CN5 | 1 | 12.6 | 12.6 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.1 | 0.1 |
| CN6 | 1 | 5.1 | 5.1 |
| | 2 | 0.0 | 0.0 |
| CN101 | 1 | 5.1 | 5.1 |
| | 2 | 12.6 | 12.6 |
| | 3 | 5.3 | 5.3 |
| | 4 | 12.4 | 12.4 |
| | 5 | 0.0 | 0.0 |
| CN102 | 1 | 5.1 | 5.1 |
| | 2 | 12.6 | 12.6 |
| | 3 | 5.3 | 5.3 |
| | 4 | 12.4 | 12.4 |
| | 5 | 0.0 | 0.0 |
| CN103 | 1 | 12.4 | 12.4 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 5.3 | 5.3 |
| | 6 | 5.3 | 5.3 |
| CN201 | 1 | 5.1 | 5.1 |
| | 2 | 0.1 | 0.1 |
| | 3 | 5.2 | 5.2 |
| | 4 | 0.1 | 0.1 |
| | 5 | 5.0 | 5.0 |
| | 6 | 0.4 | 0.4 |
| CN202 | 1 | 0.2 | 0.2 |
| | 2 | 0.3 | 0.3 |
| | 3 | 0.3 | 0.3 |
| | 4 | 0.3 | 0.3 |
| | 5 | 0.2 | 0.2 |
| | 6 | 2.7 | 2.7 |
| | 7 | 0.0 | 0.0 |

6

## 4.21 MECHACON SUB CIRCUIT BOARD

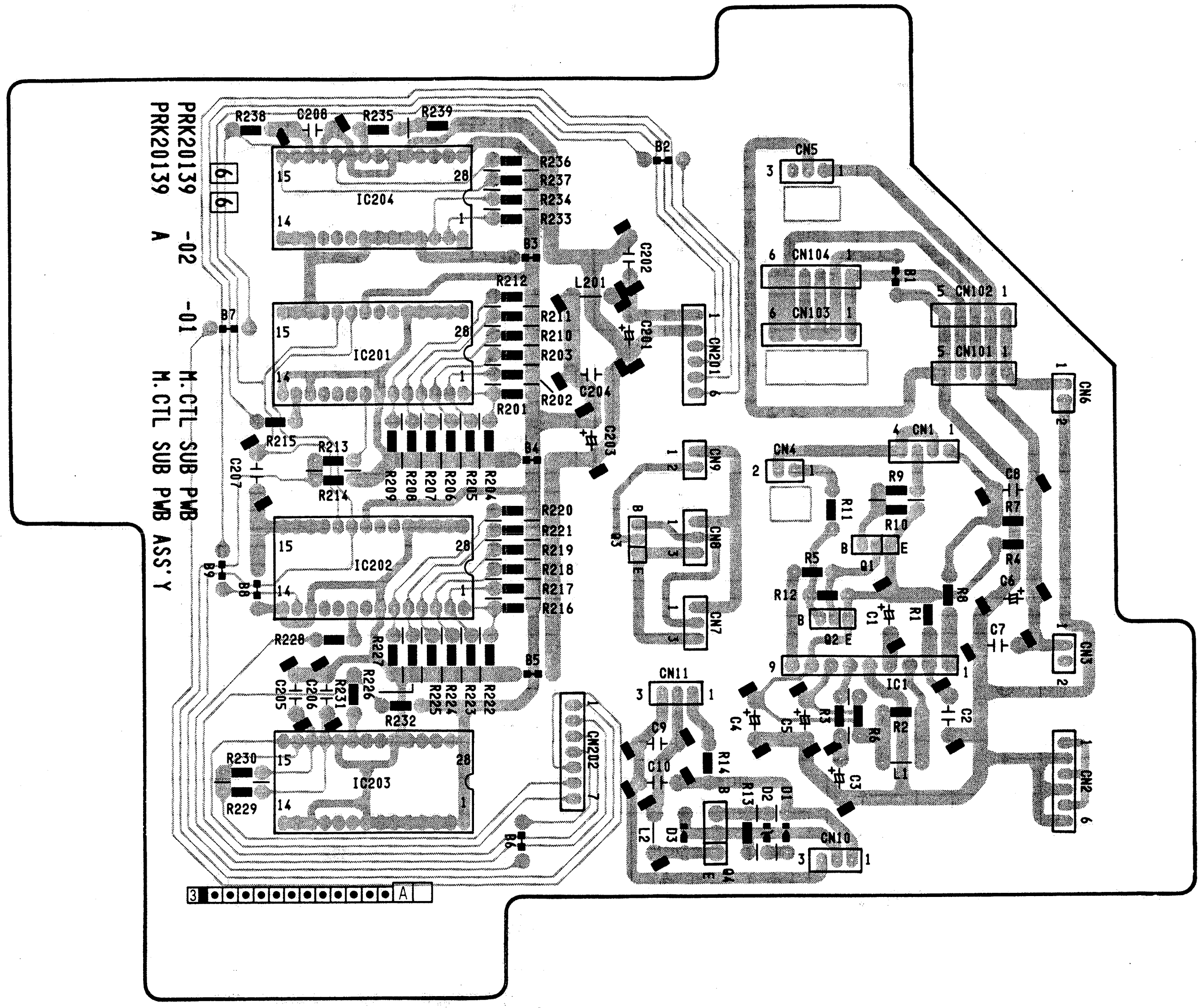
5

4

3

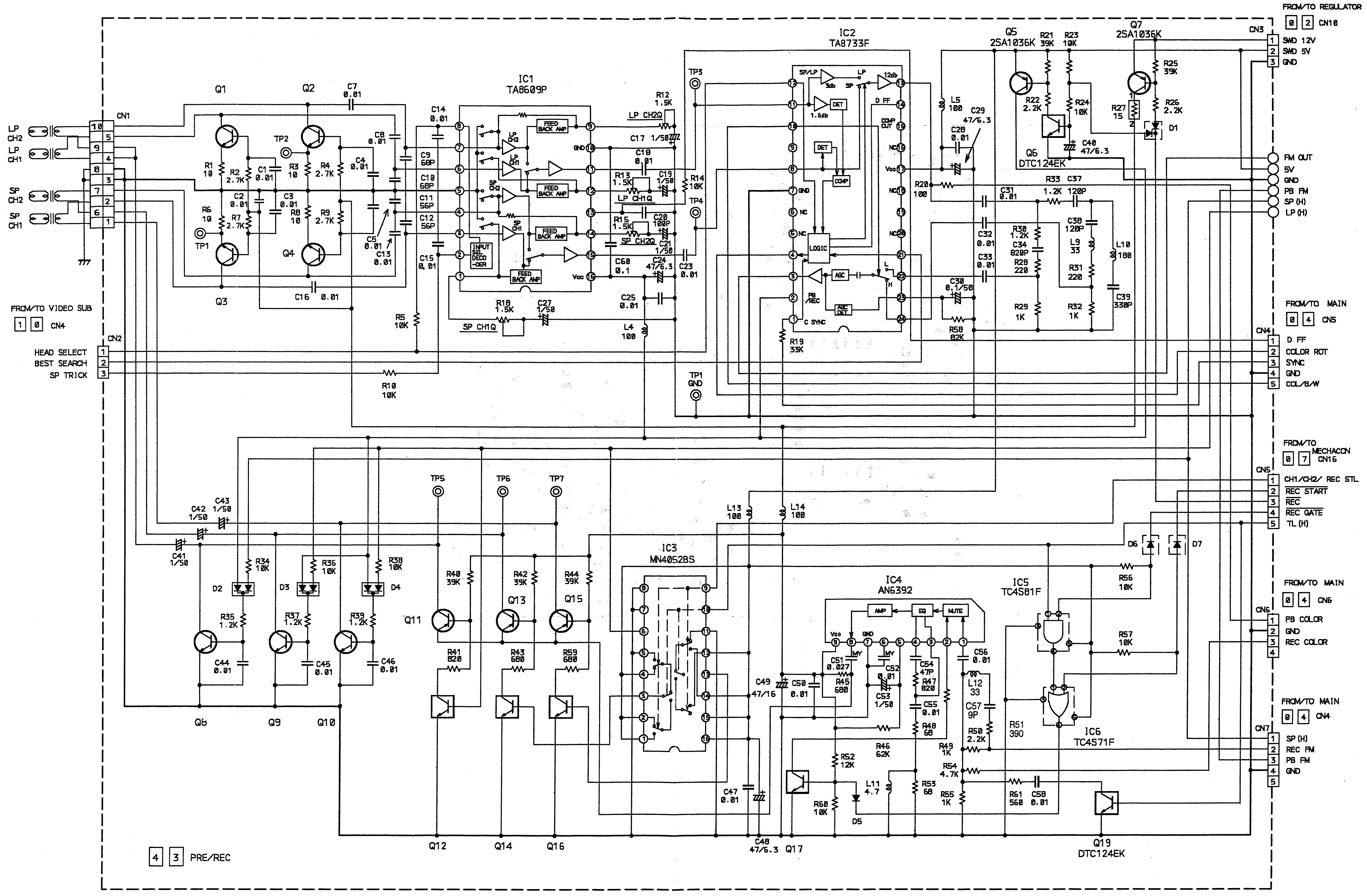
2

1


PRK20139 -02 -01
PRK20139 A
M.CTL SUB PWB
M.CTL SUB PWB ASS'Y
IC201
IC202
IC203
IC204
IC1
CN1
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
CN101
CN102
CN103
CN104
CN201
CN202
Q1
Q2
Q3
Q4
L1
L2
L201
D1
D2
D3
B1
B2
B3
B4
B5
B6
B7
B8
B9
R238
C208
R235
R239
R236
R237
R234
R233
R212
R211
R210
R203
R202
R201
R213
R214
R215
R209
R208
R207
R206
R205
R204
R220
R221
R219
R218
R217
R216
R228
R227
R226
R231
R232
R225
R224
R223
R222
R230
R229
C201
C202
C203
C204
C205
C206
C207
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
A

A B C 4-29 4-29 E F G H

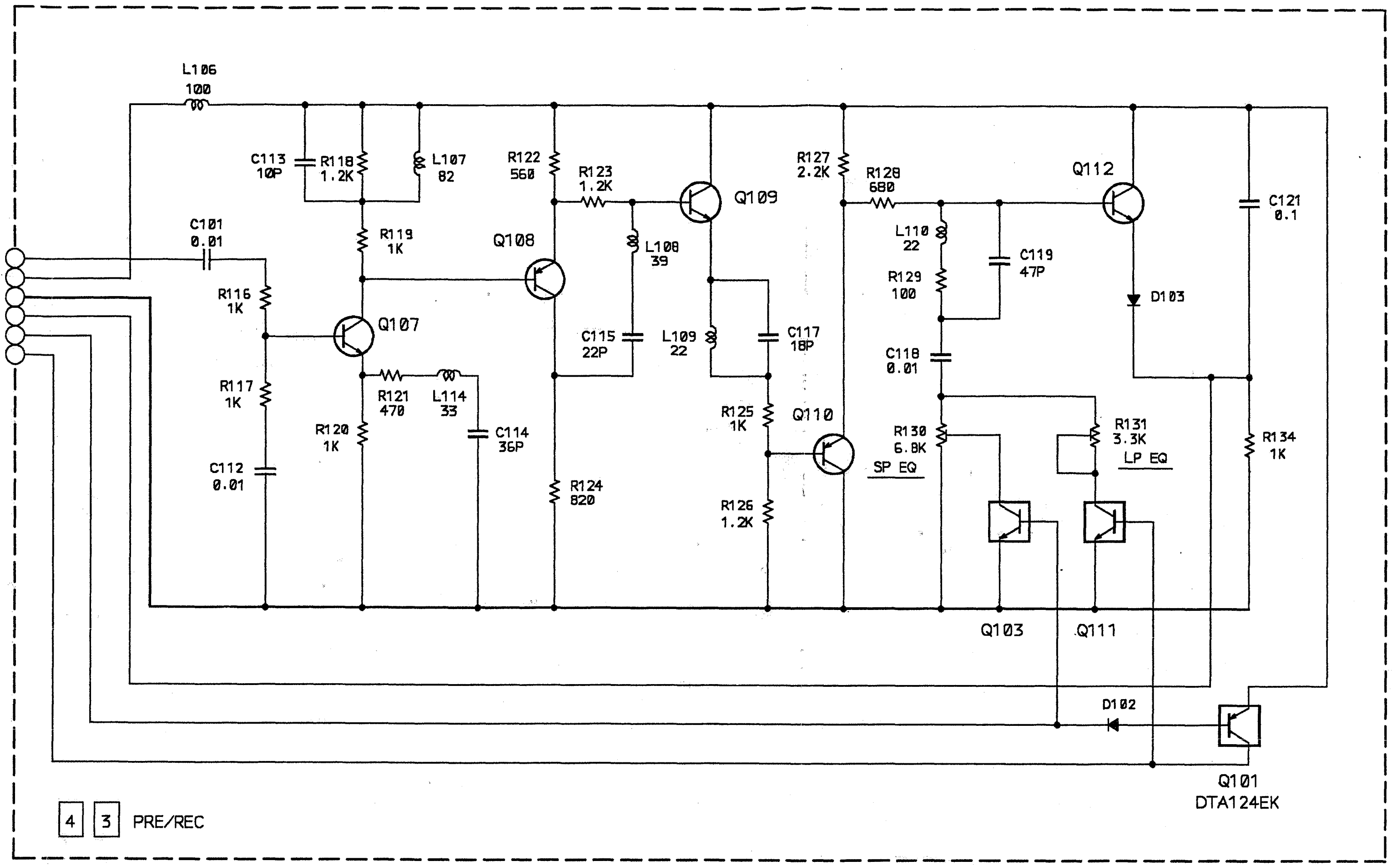
## 4.22 VIDEO PRE/REC SCHEMATIC DIAGRAM (1/2)


LP CH2
LP CH1
SP CH2
SP CH1
CN1
FROM/TO VIDEO SUB
1 0 CN4
CN2
HEAD SELECT
BEST SEARCH
SP TRICK
Q1
Q2
Q3
Q4
C7 0.01
TP1
TP2
R1 10
R2 2.7K
C1 0.01
C2 0.01
R3 10
C3 0.01
R4 2.7K
C4 0.01
R6 10
R7 2.7K
R8 10
R9 2.7K
C5 0.01
C8 0.01
C13 0.01
C16 0.01
C9 68P
C10 68P
C11 56P
C12 56P
C14 0.01
C15 0.01
R5 10K
R10 10K
IC1 TA8609P
FEED BACK AMP
INPUT SEL DECO -DER
R18 1.5K
C27 1/50
SP CH1Q
R12 1.5K
LP CH2Q
C17 1/50
C18 0.01
C19 1/50
R13 1.5K
LP CH1Q
R15 1.5K
C20 100P
SP CH2Q
C21 1/50
C60 0.1
C24 47/6.3
C23 0.01
C25 0.01
L4 100
R14 10K
TP3
TP4
TP1 GND
IC2 TA8733F
SP/LP
LP
SP
12db
3db
1.6db
DET
D FF
COMP OUT
COMP
LOGIC
AGC
PB /REC
AGC DET
C SYNC
GND
NC
Vcc
R19 33K
L5 100
C28 0.01
C29 47/6.3
R20 100
C31 0.01
C32 0.01
C33 0.01
C30 0.1/50
R58 82K
R30 1.2K
C34 820P
R28 220
R29 1K
R33 1.2K
C37 120P
C38 120P
L9 33
R31 220
R32 1K
L10 100
C39 330P
Q5 2SA1036K
R21 39K
R23 10K
R22 2.2K
R24 10K
Q6 DTC124EK
C40 47/6.3
Q7 2SA1036K
R25 39K
R26 2.2K
R27 15
D1
CN3
FROM/TO REGULATOR
0 2 CN10
SWD 12V
SWD 5V
GND
FM OUT
5V
GND
PB FM
SP (H)
LP (H)
FROM/TO MAIN
0 4 CN5
CN4
D FF
COLOR ROT
SYNC
GND
COL/B/W
FROM/TO MECHACON
0 7 CN16
CN5
CH1/CH2/ REC STL
REC START
REC
REC GATE
TL (H)
C41 1/50
C42 1/50
C43 1/50
R34 10K
R36 10K
R38 10K
D2
D3
D4
R35 1.2K
R37 1.2K
R39 1.2K
C44 0.01
C45 0.01
C46 0.01
Q8
Q9
Q10
TP5
TP6
TP7
R40 39K
R42 39K
R44 39K
Q11
Q13
Q15
R41 820
R43 680
R59 680
Q12
Q14
Q16
L13 100
L14 100
IC3 MN4052BS
C47 0.01
C48 47/6.3
C49 47/16
C50 0.01
Q17
IC4 AN6392
AMP
EQ
MUTE
Vcc
GND
MY
C51 0.027
R45 680
C52 0.01
C53 1/50
C54 47P
R47 820
C55 0.01
R48 68
R46 62K
R52 12K
R60 10K
L11 4.7
D5
R53 68
R49 1K
R54 4.7K
R55 1K
C56 0.01
L12 33
C57 9P
R50 2.2K
R51 390
R61 560
C58 0.01
IC5 TC4S81F
IC6 TC4S71F
D6
D7
R56 10K
R57 10K
Q19 DTC124EK
FROM/TO MAIN
0 4 CN6
CN6
PB COLOR
GND
REC COLOR
FROM/TO MAIN
0 4 CN4
CN7
SP (H)
REC FM
PB FM
GND
4 3 PRE/REC
6
5
4
3
2
1
A
B
C
D
E
F
G
H

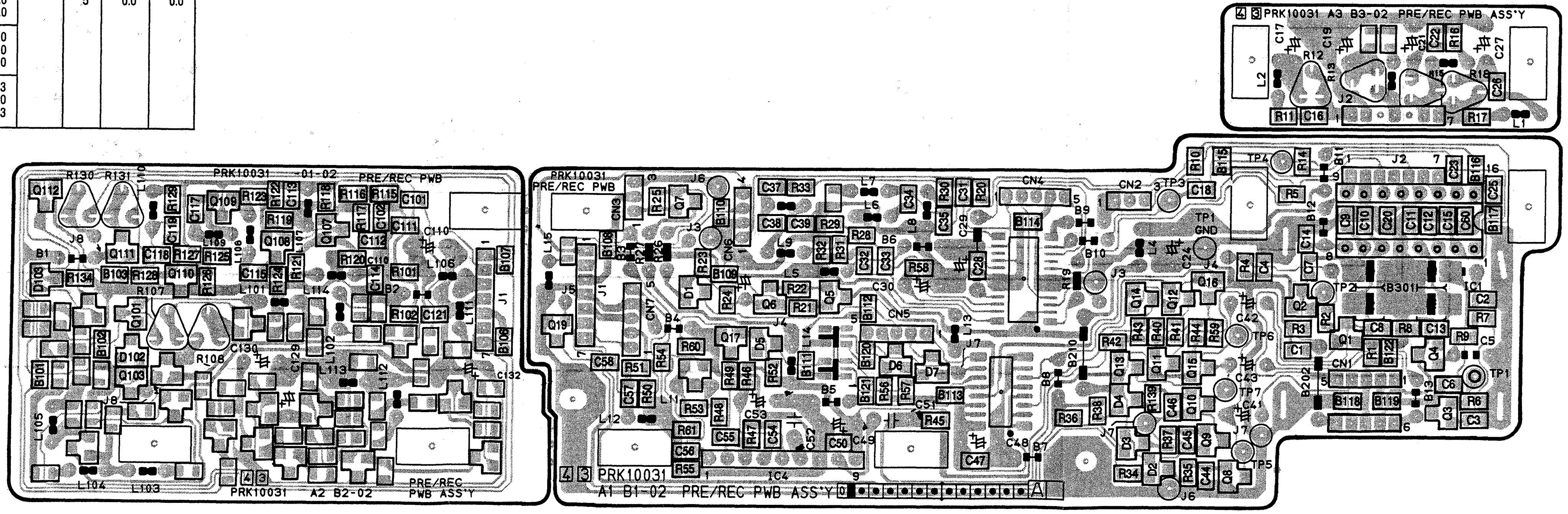
# — PRE/REC Voltage —

| Symbol | No. | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC1 | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16 | 0.0<br>0.0<br>0.0<br>0.3<br>0.0<br>0.3<br>0.3<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.7<br>0.0<br>0.0<br>0.5 | 1.0<br>0.0<br>0.7<br>0.3<br>0.0<br>0.3<br>0.3<br>0.0<br>4.0<br>0.0<br>4.4<br>4.1<br>2.3<br>1.0<br>3.1<br>5.2 |
| IC2 | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22<br>23<br>24 | 0.9<br>0.4<br>4.4<br>2.2<br>0.0<br>0.0<br>0.0<br>2.7<br>0.3<br>4.7<br>2.7<br>0.0<br>4.4<br>0.0<br>2.6<br>0.0<br>5.3<br>0.0<br>0.0<br>0.0<br>0.0<br>2.9<br>0.0<br>2.9 | 0.9<br>5.3<br>2.7<br>2.2<br>0.0<br>0.0<br>0.0<br>3.6<br>0.3<br>4.7<br>3.7<br>0.0<br>2.3<br>0.0<br>2.6<br>0.0<br>5.3<br>0.0<br>0.0<br>0.0<br>0.0<br>3.5<br>0.0<br>3.5 |
| IC3 | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16 | 5.3<br>5.3<br>5.3<br>5.3<br>0.0<br>0.0<br>0.0<br>0.0<br>5.1<br>0.0<br>0.0<br>5.3<br>5.3<br>5.3<br>5.3<br>5.3 | 5.3<br>5.3<br>5.3<br>5.3<br>0.0<br>0.0<br>0.0<br>0.0<br>5.1<br>0.0<br>0.0<br>5.3<br>5.3<br>5.3<br>5.3<br>5.3 |
| IC4 | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9 | 5.6<br>11.5<br>5.6<br>5.6<br>6.3<br>5.6<br>0.0<br>5.6<br>11.5 | 0.1<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 |
| IC5 | 1<br>2<br>3<br>4<br>5 | 0.0<br>5.3<br>0.0<br>0.0<br>5.3 | 0.0<br>5.3<br>0.0<br>0.0<br>5.3 |
| IC6 | 1<br>2<br>3<br>4<br>5 | 0.0<br>0.6<br>0.0<br>0.2<br>5.3 | 0.0<br>5.3<br>0.0<br>5.3<br>5.3 |
| **TRANSISTOR** | | | |
| Q1 | B<br>C<br>E | 0.8<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0 |
| Q2 | B<br>C<br>E | 0.8<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0 |
| Q3 | B<br>C<br>E | 0.8<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0 |
| Q4 | B<br>C<br>E | 0.8<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0 |
| Q5 | B<br>C<br>E | 5.3<br>0.4<br>5.3 | 4.6<br>5.3<br>5.3 |
| Q6 | B<br>C<br>E | 0.7<br>5.3<br>0.0 | 3.1<br>0.0<br>0.0 |
| Q7 | B<br>C<br>E | 11.6<br>12.3<br>12.4 | 12.3<br>0.0<br>12.4 |
| Q8 | B<br>C<br>E | 0.7<br>0.0<br>0.0 | 0.7<br>0.0<br>0.0 |
| Q9 | B<br>C<br>E | 0.4<br>4.5<br>0.0 | 0.7<br>0.0<br>0.0 |
| Q10 | B<br>C<br>E | 0.4<br>4.5<br>0.0 | 0.7<br>0.0<br>0.0 |
| Q11 | B<br>C<br>E | 10.2<br>0.0<br>4.5 | 0.0<br>0.0<br>0.0 |
| Q12 | B<br>C<br>E | 0.0<br>10.2<br>0.0 | 0.0<br>0.0<br>0.0 |
| Q13 | B<br>C<br>E | 3.7<br>4.5<br>4.5 | 0.0<br>0.0<br>0.0 |
| Q14 | B<br>C<br>E | 5.3<br>0.1<br>0.0 | 5.3<br>0.0<br>0.0 |
| Q15 | B<br>C<br>E | 3.7<br>4.5<br>4.5 | 0.0<br>0.0<br>0.0 |
| Q16 | B<br>C<br>E | 5.3<br>0.1<br>0.0 | 5.3<br>0.0<br>0.0 |
| Q17 | B<br>C<br>E | 0.8<br>11.5<br>0.0 | 0.0<br>0.0<br>0.0 |
| Q19 | B<br>C<br>E | 0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0 |
| Q101 | B<br>C<br>E | 5.3<br>0.0<br>5.3 | 5.3<br>0.0<br>5.3 |
| Q103 | B<br>C<br>E | 5.2<br>0.0<br>0.0 | 5.2<br>0.0<br>0.0 |
| Q107 | B<br>C<br>E | 2.7<br>3.2<br>2.1 | 2.7<br>3.2<br>2.1 |
| Q108 | B<br>C<br>E | 3.2<br>2.1<br>3.8 | 3.2<br>2.1<br>3.8 |
| Q109 | B<br>C<br>E | 3.8<br>5.3<br>3.2 | 3.8<br>5.3<br>3.2 |
| Q110 | B<br>C<br>E | 1.8<br>0.0<br>2.4 | 1.8<br>0.0<br>2.4 |
| Q111 | B<br>C<br>E | 0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0 |
| Q112 | B<br>C<br>E | 2.4<br>5.3<br>2.0 | 2.4<br>5.3<br>2.0 |
| **CONNECTOR** | | | |
| CN1 | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 |
| CN2 | 1<br>2<br>3 | 0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0 |
| CN3 | 1<br>2<br>3 | 12.4<br>5.3<br>0.0 | 12.4<br>5.3<br>0.0 |
| CN4 | 1<br>2<br>3<br>4<br>5 | 0.0<br>0.0<br>1.5<br>0.0<br>4.8 | 0.0<br>0.0<br>0.6<br>0.0<br>4.7 |
| CN5 | 1<br>2<br>3<br>4<br>5 | 5.1<br>0.1<br>0.4<br>5.1<br>0.0 | 5.1<br>5.1<br>12.5<br>5.1<br>0.0 |
| CN6 | 1<br>2<br>3<br>4 | 4.4<br>0.0<br>0.9<br>5.3 | 2.3<br>0.0<br>0.9<br>5.3 |
| CN7 | 1<br>2<br>3<br>4<br>5 | 5.2<br>2.8<br>2.3<br>0.0<br>0.0 | 5.2<br>2.8<br>2.3<br>0.0<br>0.0 |

## 4.23 VIDEO PRE/REC SCHEMATIC DIAGRAM (2/2) & CIRCUIT BOARD

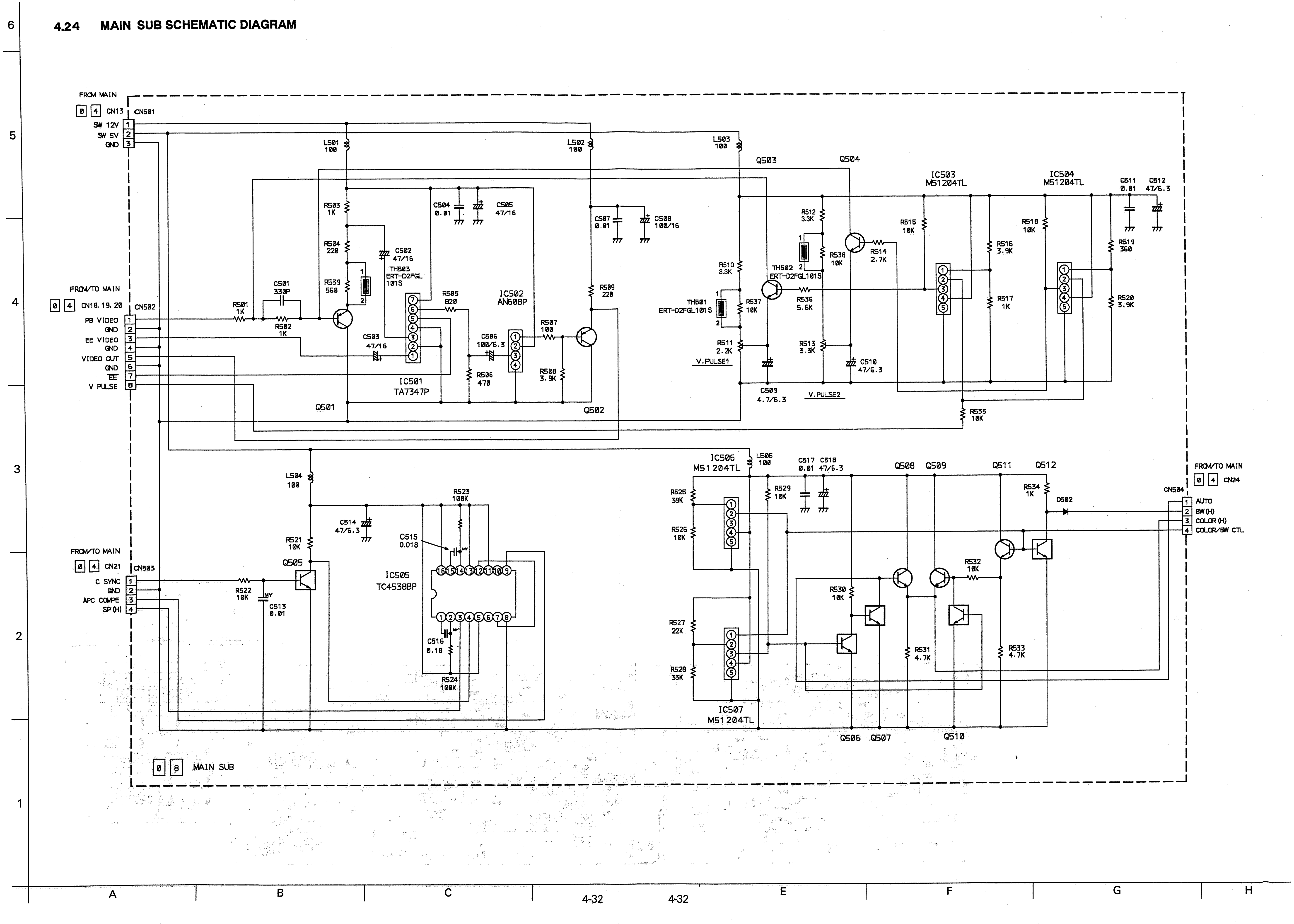


FM IN
5V
GND
PB FM
SP (H)
LP (H)
L106 100
C113 10P
R118 1.2K
L107 82
R122 560
R123 1.2K
Q109
R127 2.2K
R128 680
Q112
C121 0.1
C101 0.01
R119 1K
Q108
L108 39
L110 22
R129 100
C119 47P
D103
R116 1K
Q107
C115 22P
L109 22
C117 18P
C118 0.01
R117 1K
R121 470
L114 33
R120 1K
C114 36P
R125 1K
Q110
R130 6.8K
SP EQ
R131 3.3K
LP EQ
R134 1K
C112 0.01
R124 820
R126 1.2K
Q103
Q111
D102
Q101
DTA124EK
4 3 PRE/REC



4 3 PRK10031 A3 B3-02 PRE/REC PWB ASS'Y
PRK10031 -01-02 PRE/REC PWB
4 3 PRK10031 A2 B2-02 PRE/REC PWB ASS'Y
PRK10031 PRE/REC PWB
4 3 PRK10031 A1 B1-02 PRE/REC PWB ASS'Y
Q112
R130
R131
Q109
Q107
Q108
Q110
Q111
Q101
Q102
Q103
D102
IC4
CN1
CN2
CN3
CN4
CN5
CN6
CN7
J1
J2
J3
J4
J5
J6
J7
J8
TP1
TP2
TP3
TP4
TP5
TP6
TP7
IC1

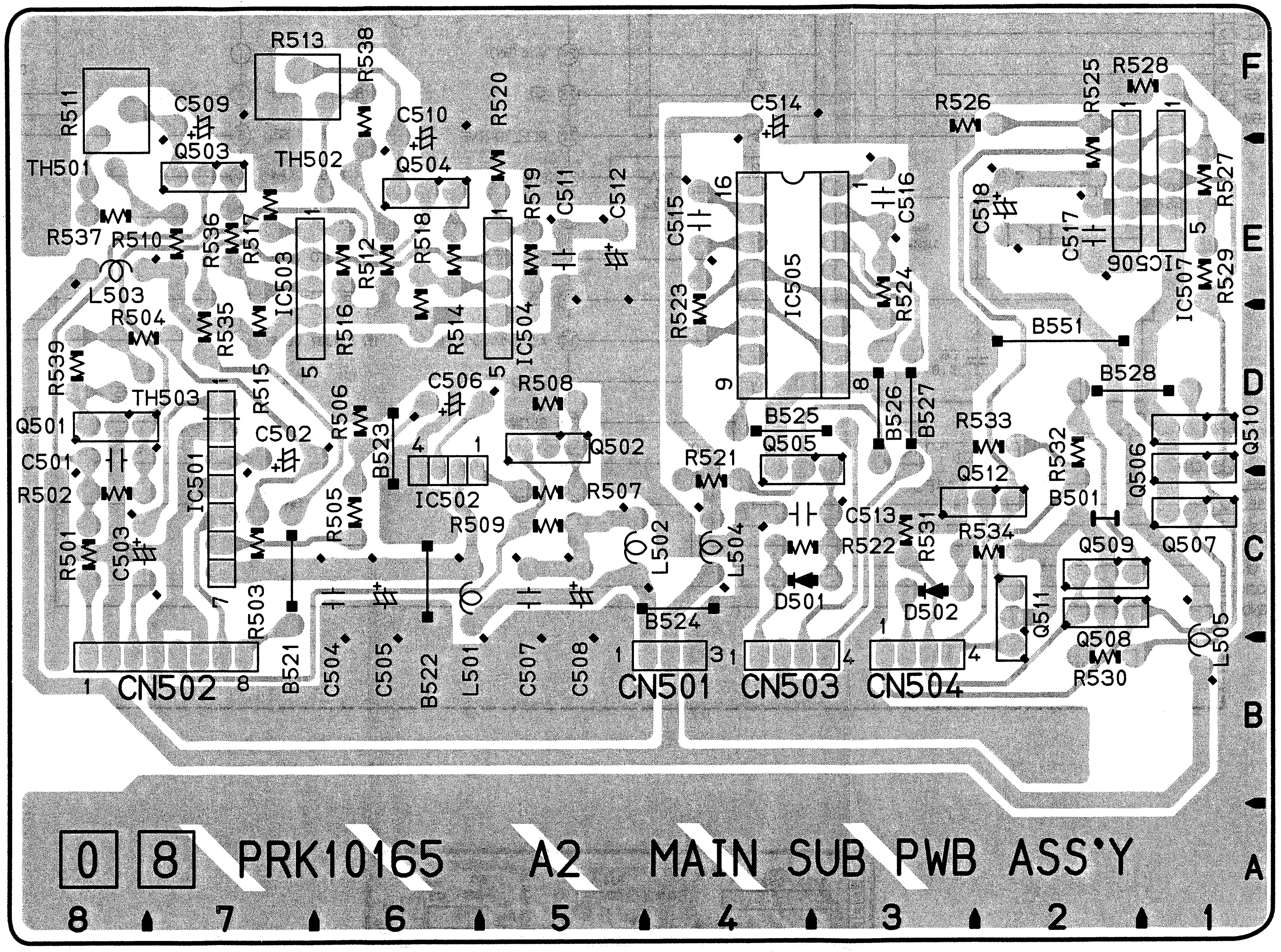
## 4.24 MAIN SUB SCHEMATIC DIAGRAM


6
5
4
3
2
1
A
B
C
D
E
F
G
H
FROM MAIN
0 4 CN13
CN501
1 SW 12V
2 SW 5V
3 GND
L501 100
L502 100
L503 100
Q503
Q504
IC503 M51204TL
IC504 M51204TL
C511 0.01
C512 47/6.3
R503 1K
R504 220
C504 0.01
C505 47/16
C502 47/16
TH503 ERT-D2FGL101S
R539 560
C501 330P
R501 1K
R502 1K
C503 47/16
R505 820
IC502 AN608P
C506 100/6.3
R506 470
R507 100
R508 3.9K
IC501 TA7347P
Q501
Q502
C507 0.01
C508 100/16
R509 220
R510 3.3K
TH501 ERT-D2FGL101S
R537 10K
R511 2.2K
V.PULSE1
C509 4.7/6.3
R512 3.3K
TH502 ERT-D2FGL101S
R538 10K
R536 5.6K
R513 3.3K
V.PULSE2
R514 2.7K
C510 47/6.3
R515 10K
R516 3.9K
R517 1K
R518 10K
R519 360
R520 3.9K
R535 10K
FROM/TO MAIN
0 4 CN18, 19, 20
CN502
1 PB VIDEO
2 GND
3 EE VIDEO
4 GND
5 VIDEO OUT
6 GND
7 EE
8 V PULSE
L504 100
C514 47/6.3
R521 10K
R523 100K
C515 0.018
Q505
IC505 TC4538BP
R522 10K
C513 0.01
C516 0.18
R524 100K
FROM/TO MAIN
0 4 CN21
CN503
1 C SYNC
2 GND
3 APC COMPE
4 SP (H)
IC506 M51204TL
L505 100
C517 0.01
C518 47/6.3
Q508
Q509
Q511
Q512
R525 39K
R529 10K
R526 10K
R534 1K
D502
R532 10K
R530 10K
R527 22K
R528 33K
R531 4.7K
R533 4.7K
IC507 M51204TL
Q506
Q507
Q510
FROM/TO MAIN
0 4 CN24
CN504
1 AUTO
2 BW (H)
3 COLOR (H)
4 COLOR/BW CTL
0 8 MAIN SUB

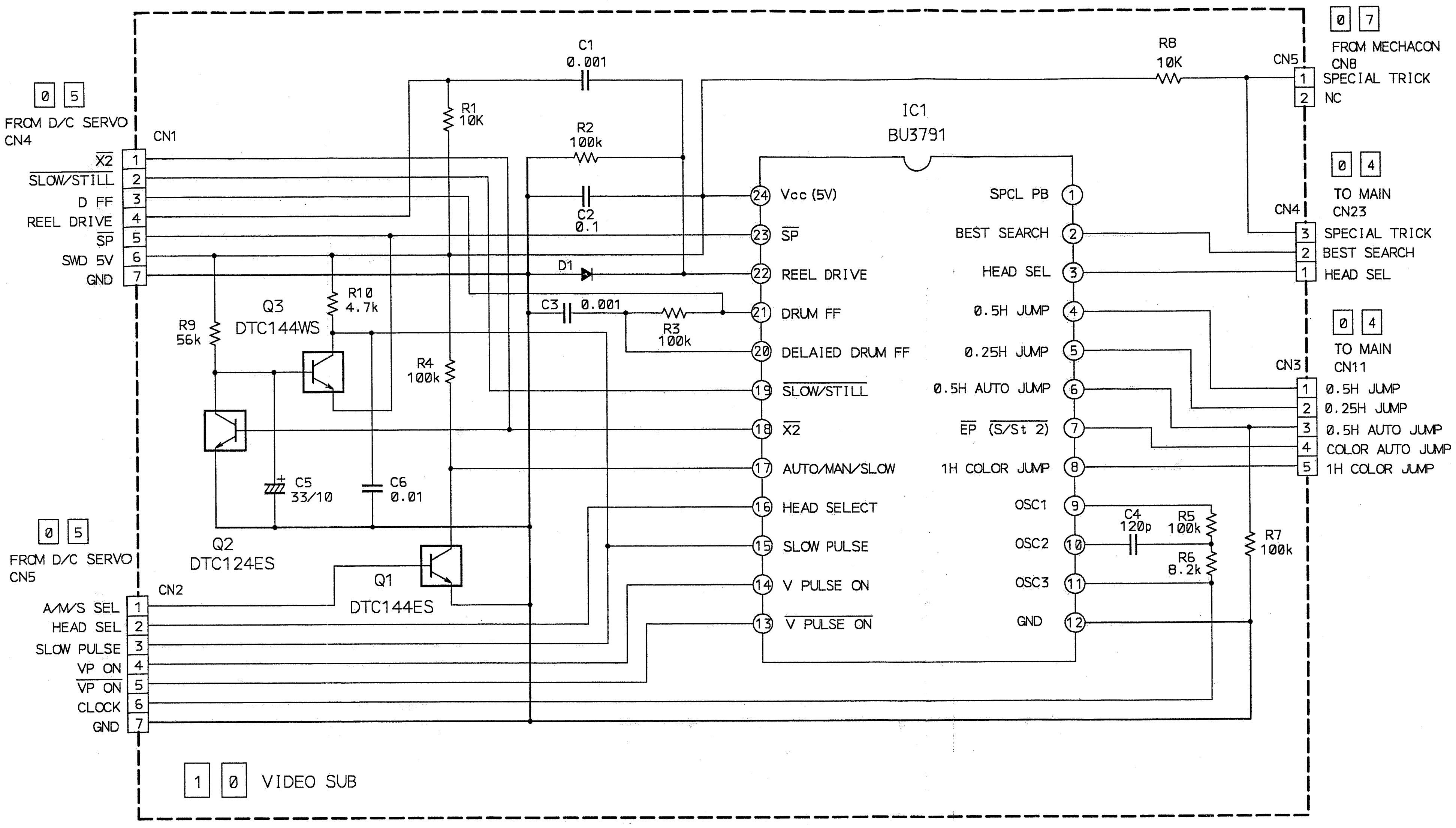
## 4.25 MAIN SUB CIRCUIT BOARD

### — MAIN SUB Voltage —

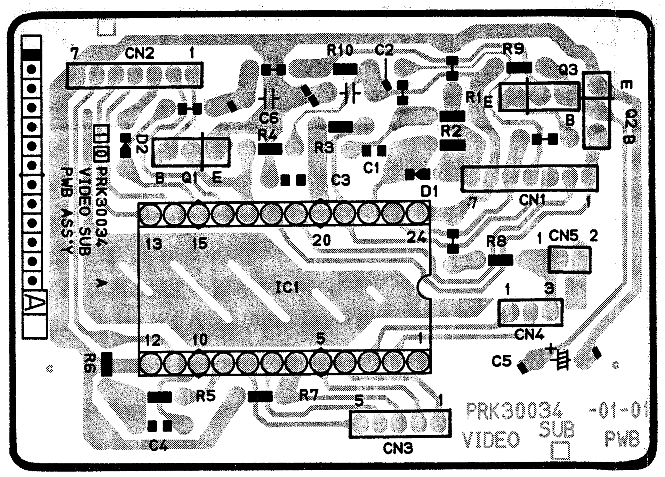
| Symbol No. | | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC501 | 1 | 8.6 | 8.6 |
| | 2 | 0.0 | 0.0 |
| | 3 | 8.6 | 8.6 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.1 | 5.2 |
| | 6 | 7.7 | 7.7 |
| | 7 | 12.3 | 12.3 |
| IC502 | 1 | 7.3 | 7.2 |
| | 2 | 12.3 | 12.4 |
| | 3 | 2.7 | 2.7 |
| | 4 | 0.0 | 0.0 |
| IC503 | 1 | 1.1 | 1.1 |
| | 2 | 0.1 | 0.2 |
| | 3 | 0.0 | 0.0 |
| | 4 | 5.3 | 5.3 |
| | 5 | 0.0 | 0.0 |
| IC504 | 1 | 4.9 | 4.9 |
| | 2 | 0.1 | 0.2 |
| | 3 | 0.0 | 0.0 |
| | 4 | 5.3 | 5.3 |
| | 5 | 0.0 | 0.0 |
| IC505 | 1 | 0.0 | 0.0 |
| | 2 | 2.3 | 2.3 |
| | 3 | 4.8 | 5.1 |
| | 4 | 5.3 | 5.3 |
| | 5 | 5.3 | 5.3 |
| | 6 | 4.7 | 4.8 |
| | 7 | 0.6 | 0.6 |
| | 8 | 0.0 | 0.0 |
| | 9 | 4.5 | 4.6 |
| | 10 | 0.7 | 0.7 |
| | 11 | 5.3 | 5.3 |
| | 12 | 0.6 | 0.6 |
| | 13 | 5.3 | 5.3 |
| | 14 | 4.6 | 4.6 |
| | 15 | 0.0 | 0.0 |
| | 16 | 5.3 | 5.3 |
| IC506 | 1 | 1.1 | 1.1 |
| | 2 | 2.0 | 2.0 |
| | 3 | 3.2 | 3.2 |
| | 4 | 5.3 | 5.3 |
| | 5 | 0.0 | 0.0 |
| IC507 | 1 | 2.0 | 2.0 |
| | 2 | 3.2 | 0.0 |
| | 3 | 0.0 | 3.2 |
| | 4 | 5.3 | 5.3 |
| | 5 | 0.0 | 0.0 |
| **TRANSISTOR** | | | |
| Q501 | B | 1.1 | 1.5 |
| | C | 0.0 | 0.0 |
| | E | 1.8 | 2.1 |
| Q502 | B | 7.0 | 7.0 |
| | C | 0.0 | 0.0 |
| | E | 7.7 | 7.7 |
| Q503 | B | 0.0 | 0.0 |
| | C | 1.1 | 1.4 |
| | E | 1.0 | 1.0 |
| Q504 | B | 0.0 | 0.0 |
| | C | 1.1 | 1.5 |
| | E | 1.3 | 1.3 |
| Q505 | B | 0.4 | 0.4 |
| | C | 5.3 | 5.3 |
| | E | 0.0 | 0.0 |
| Q506 | B | 3.2 | 3.2 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q507 | B | 0.0 | 0.0 |
| | C | 5.2 | 5.2 |
| | E | 0.0 | 0.0 |
| Q508 | B | 5.2 | 5.2 |
| | C | 5.3 | 5.3 |
| | E | 4.6 | 4.6 |
| Q509 | B | 0.0 | 0.0 |
| | C | 5.3 | 5.3 |
| | E | 4.6 | 4.6 |
| Q510 | B | 3.2 | 3.2 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q511 | B | 2.0 | 2.0 |
| | C | 5.3 | 5.3 |
| | E | 1.4 | 1.4 |
| Q512 | B | 0.0 | 0.0 |
| | C | 0.1 | 0.1 |
| | E | 2.0 | 2.0 |
| **CONNECTOR** | | | |
| CN501 | 1 | 12.4 | 12.4 |
| | 2 | 5.3 | 5.3 |
| | 3 | 0.0 | 0.0 |
| CN502 | 1 | 1.1 | 1.4 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.6 | 0.2 |
| | 4 | 0.0 | 0.0 |
| | 5 | 7.7 | 7.7 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 5.2 |
| | 8 | 0.1 | 0.2 |
| CN503 | 1 | 0.5 | 0.5 |
| | 2 | 0.0 | 0.0 |
| | 3 | 4.6 | 4.6 |
| | 4 | 4.8 | 5.1 |
| CN504 | 1 | 5.2 | 5.2 |
| | 2 | 1.6 | 1.6 |
| | 3 | 4.6 | 4.6 |
| | 4 | 2.0 | 2.0 |


R513
R538
R511
C509
Q503
TH501
TH502
C510
Q504
R520
R519
C511
C512
C514
R526
R525
R528
R527
R537
R510
R536
R517
IC503
R512
R518
C515
16
IC505
C516
C518
C517
IC506
IC507
R529
L503
R504
R535
R516
R514
IC504
R523
R524
B551
R539
TH503
R515
R506
C506
R508
9
8
B526
B527
B528
Q501
C501
R502
IC501
C502
B523
IC502
Q502
R521
B525
Q505
R533
Q512
R532
Q506
Q510
B501
R505
R509
R507
L502
L504
C513
R522
R531
R534
Q509
Q507
R501
C503
R503
D501
D502
Q511
Q508
R530
L505
CN502
B521
C504
C505
B522
L501
C507
C508
B524
CN501
CN503
CN504
0 8 PRK10165 A2 MAIN SUB PWB ASS'Y
8 7 6 5 4 3 2 1
F
E
D
C
B
A

## 4.26 VIDEO SUB SCHEMATIC DIAGRAM & CIRCUIT BOARD



0 5
FROM D/C SERVO
CN4
CN1
X2
SLOW/STILL
D FF
REEL DRIVE
SP
SWD 5V
GND
C1
0.001
R1
10K
R2
100k
C2
0.1
D1
C3
0.001
R3
100k
R10
4.7k
R9
56k
Q3
DTC144WS
R4
100k
C5
33/10
C6
0.01
Q2
DTC124ES
Q1
DTC144ES
0 5
FROM D/C SERVO
CN5
CN2
A/M/S SEL
HEAD SEL
SLOW PULSE
VP ON
VP ON
CLOCK
GND
IC1
BU3791
Vcc (5V)
SP
REEL DRIVE
DRUM FF
DELAIED DRUM FF
SLOW/STILL
X2
AUTO/MAN/SLOW
HEAD SELECT
SLOW PULSE
V PULSE ON
V PULSE ON
SPCL PB
BEST SEARCH
HEAD SEL
0.5H JUMP
0.25H JUMP
0.5H AUTO JUMP
EP (S/St 2)
1H COLOR JUMP
OSC1
OSC2
OSC3
GND
C4
120p
R5
100k
R6
8.2k
R7
100k
R8
10K
0 7
FROM MECHACON
CN8
CN5
SPECIAL TRICK
NC
0 4
TO MAIN
CN23
CN4
SPECIAL TRICK
BEST SEARCH
HEAD SEL
0 4
TO MAIN
CN11
CN3
0.5H JUMP
0.25H JUMP
0.5H AUTO JUMP
COLOR AUTO JUMP
1H COLOR JUMP
1 0
VIDEO SUB

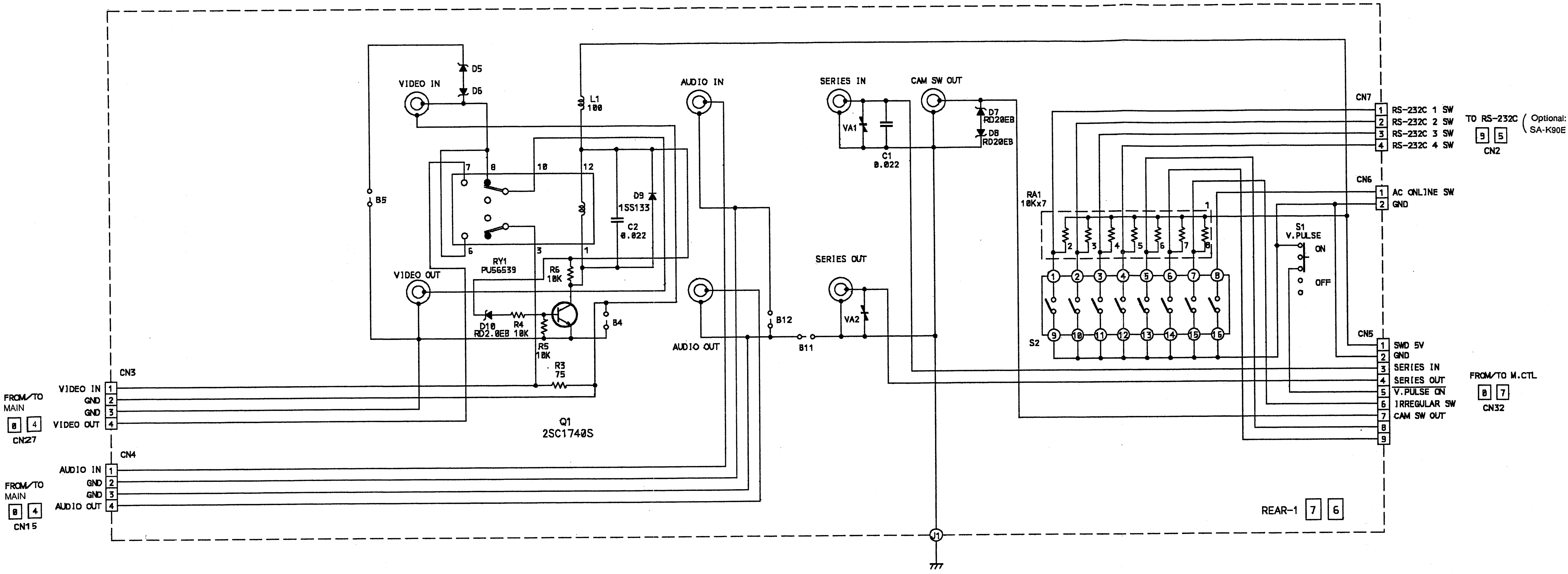


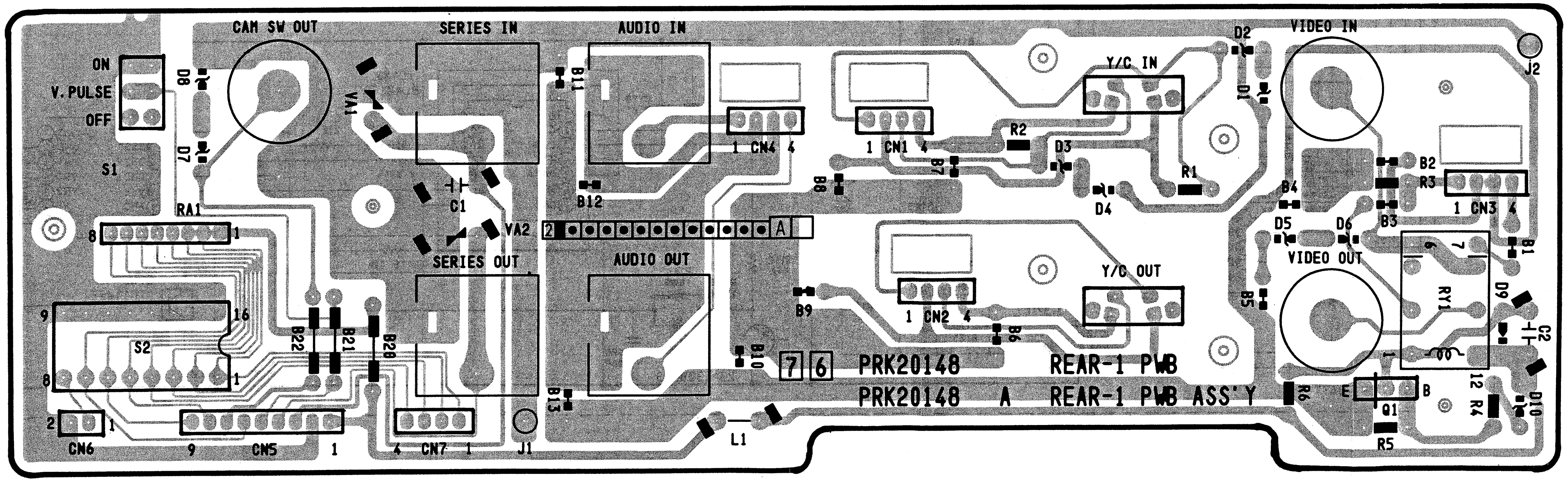
CN2
R10
C2
R9
Q3
C6
R4
R1
E
B
Q2
D2
B
Q1
E
R3
C3
C1
R2
D1
CN1
R8
CN5
PRK30034 VIDEO SUB PWB ASS'Y
A
IC1
13
15
20
24
12
10
5
1
CN4
C5
R6
R5
R7
CN3
C4
PRK30034 -01-01
VIDEO SUB PWB

### — VIDEO SUB Voltage —

| SYMBOL | No. | REC | PB |
|---|---|---|---|
| INTEGRATED CIRCUIT | | | |
| IC1 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 4.9 | 4.9 |
| | 5 | 4.9 | 4.9 |
| | 6 | 0.0 | 4.3 |
| | 7 | 0.0 | 0.0 |
| | 8 | 5.0 | 5.0 |
| | 9 | 2.3 | 2.3 |
| | 10 | 2.6 | 2.6 |
| | 11 | 2.4 | 2.6 |
| | 12 | 0.0 | 0.0 |
| | 13 | 5.0 | 5.0 |
| | 14 | 0.1 | 0.1 |
| | 15 | 5.0 | 5.0 |
| | 16 | 0.0 | 0.0 |
| | 17 | 0.0 | 0.0 |
| | 18 | 4.8 | 4.8 |
| | 19 | 5.1 | 5.1 |
| | 20 | 2.6 | 2.3 |
| | 21 | 2.6 | 2.9 |
| | 22 | 0.0 | 0.0 |
| | 23 | 0.1 | 0.1 |
| | 24 | 5.0 | 5.0 |
| TRANSISTOR | | | |
| Q1 | B | 4.3 | 4.3 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q2 | B | 4.8 | 4.8 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q3 | B | 0.0 | 0.0 |
| | C | 5.0 | 5.0 |
| | E | 0.1 | 0.1 |
| CONNECTOR | | | |
| CN1 | 1 | 4.8 | 4.8 |
| | 2 | 5.1 | 5.1 |
| | 3 | 2.2 | 5.1 |
| | 4 | 5.0 | 5.0 |
| | 5 | 0.1 | 0.1 |
| | 6 | 5.0 | 5.0 |
| | 7 | 0.0 | 0.0 |
| CN2 | 1 | 4.3 | 4.3 |
| | 2 | 0.0 | 0.0 |
| | 3 | 5.1 | 5.1 |
| | 4 | 0.1 | 0.1 |
| | 5 | 5.0 | 5.0 |
| | 6 | 2.4 | 2.4 |
| | 7 | 0.0 | 0.0 |
| CN3 | 1 | 4.9 | 4.9 |
| | 2 | 4.9 | 4.9 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 5.0 | 5.0 |
| CN4 | 1 | 0.0 | 0.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| CN5 | 1 | 0.0 | 0.0 |
| | 2 | — | — |

## 4.27 REAR-1 SCHEMATIC DIAGRAM & CIRCUIT BOARD

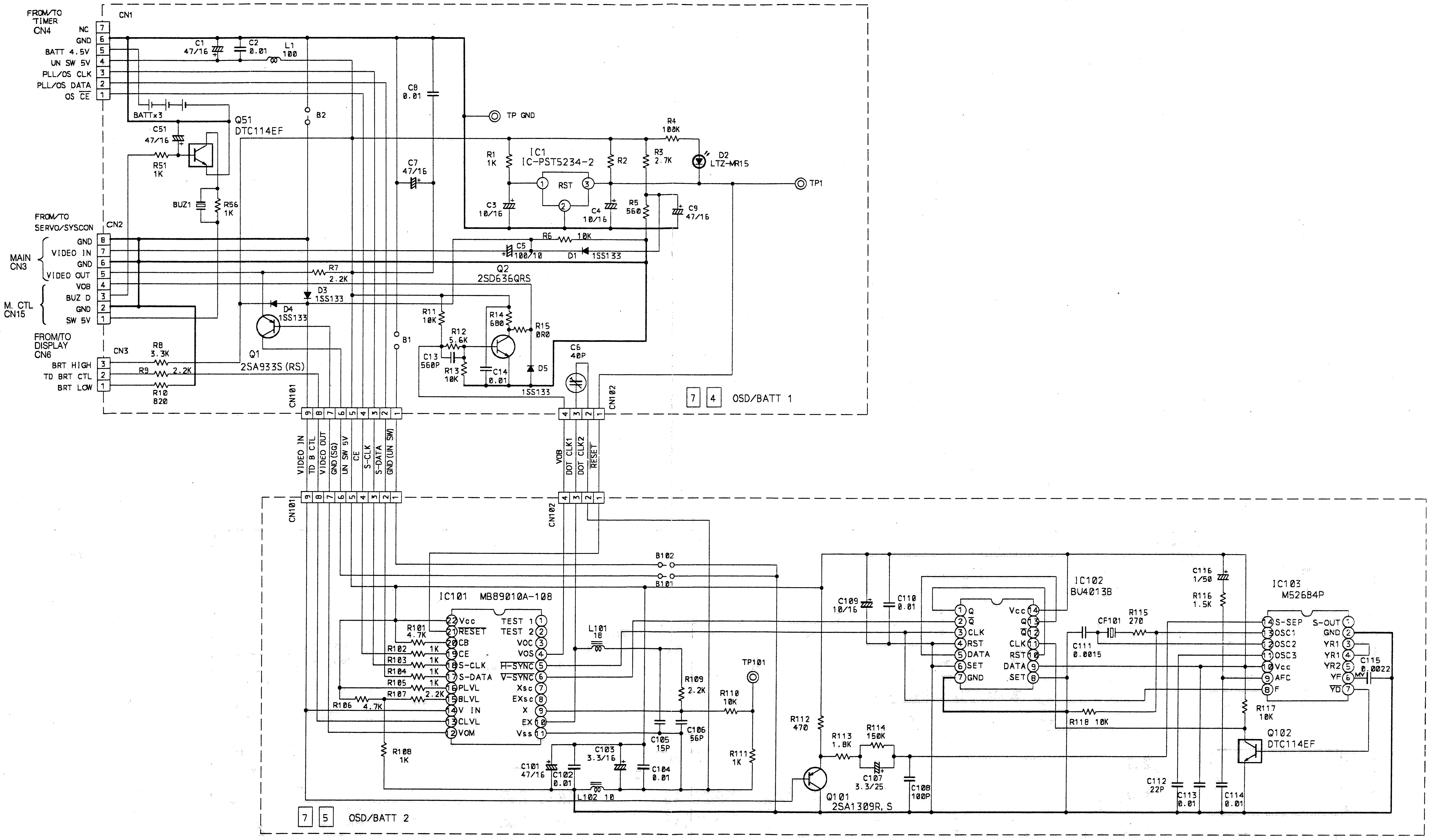

VIDEO IN
D5
D6
L1
100
AUDIO IN
SERIES IN
CAM SW OUT
VA1
C1
0.022
D7
RD20EB
D8
RD20EB
CN7
RS-232C 1 SW
RS-232C 2 SW
RS-232C 3 SW
RS-232C 4 SW
TO RS-232C
Optional:
SA-K90E
9 5
CN2
CN6
AC ONLINE SW
GND
B5
7
8
10
12
D9
1SS133
C2
0.022
6
3
1
RY1
PU56539
R6
10K
VIDEO OUT
D10
RD2.0EB
R4
10K
R5
10K
B4
R3
75
Q1
2SC1740S
AUDIO OUT
B12
B11
SERIES OUT
VA2
RA1
10Kx7
S1
V.PULSE
ON
OFF
S2
CN5
SWD 5V
GND
SERIES IN
SERIES OUT
V.PULSE ON
IRREGULAR SW
CAM SW OUT
FROM/TO M.CTL
8 7
CN32
CN3
FROM/TO
MAIN
8 4
CN27
VIDEO IN
GND
GND
VIDEO OUT
CN4
FROM/TO
MAIN
8 4
CN15
AUDIO IN
GND
GND
AUDIO OUT
REAR-1 7 6
J1


CAM SW OUT
SERIES IN
AUDIO IN
VIDEO IN
Y/C IN
ON
V.PULSE
OFF
S1
D8
D7
VA1
C1
VA2
B11
B12
1 CN4 4
1 CN1 4
R2
D3
B7
B8
R1
D4
D2
D1
J2
B2
R3
B4
1 CN3 4
B3
RA1
8
1
SERIES OUT
AUDIO OUT
2
A
D5
D6
VIDEO OUT
B1
Y/C OUT
1 CN2 4
B9
B6
B5
RY1
D9
C2
9
16
S2
8
1
B22
B21
B20
B10
B13
7 6
PRK20148
REAR-1 PWB
PRK20148 A REAR-1 PWB ASS'Y
R6
E
Q1
B
12
R4
D10
R5
L1
2
1
CN6
9
CN5
1
4
CN7
1
J1

### — REAR-1 Voltage —

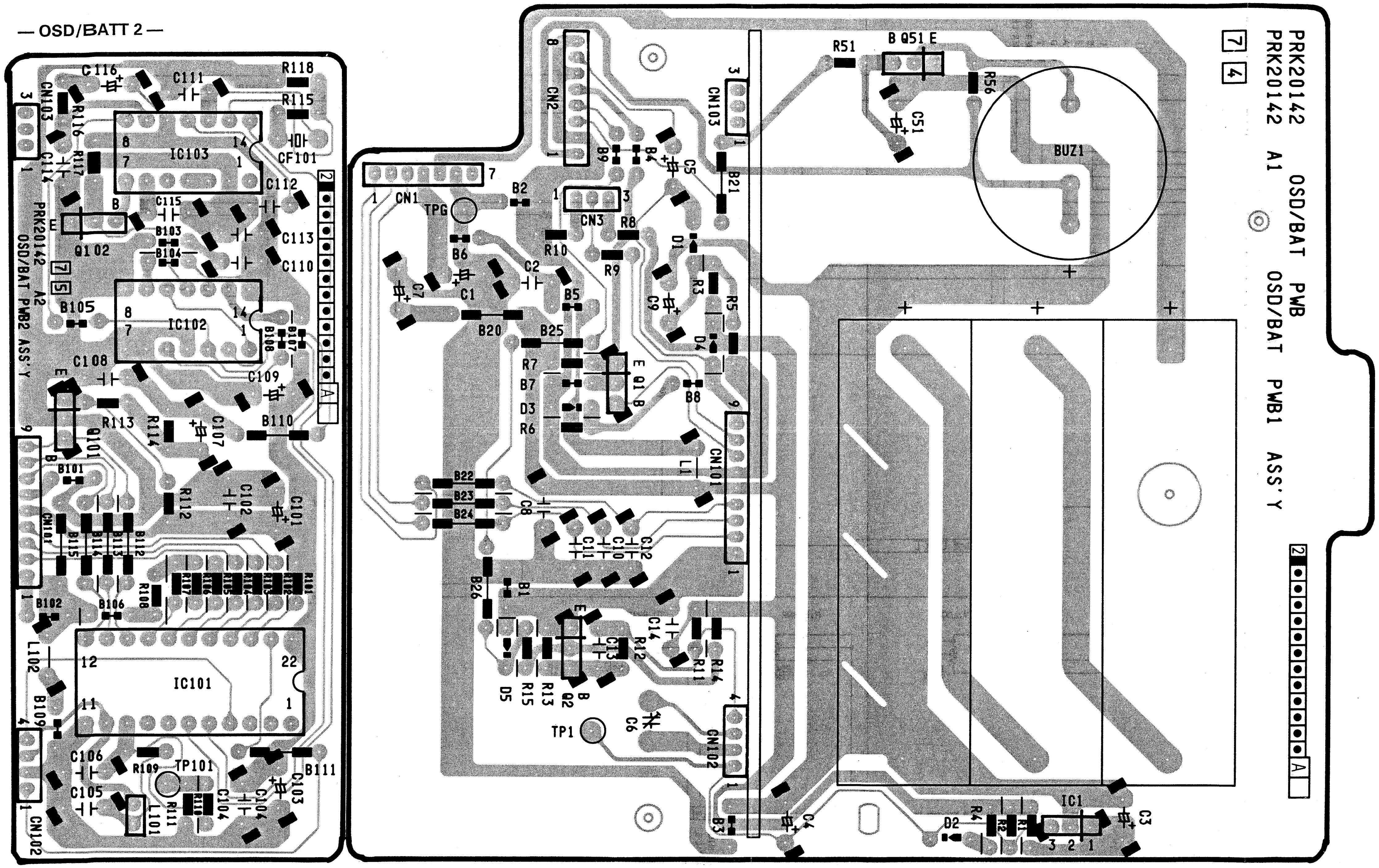
| Symbol No. | | REC | PB |
|---|---|---|---|
| CONNECTOR | | | |
| CN3 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| CN4 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| CN5 | 1 | 5.1 | 5.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 4.8 | 4.8 |
| | 4 | 5.1 | 5.1 |
| | 5 | 0.0 | 0.0 |
| | 6 | 5.1 | 5.1 |
| | 7 | 0.1 | 0.1 |
| | 8 | 5.1 | 5.1 |
| | 9 | 5.1 | 5.1 |
| CN7 | 1 | 5.1 | 5.1 |
| | 2 | 5.1 | 5.1 |
| | 3 | 5.1 | 5.1 |
| | 4 | 5.1 | 5.1 |

## 4.28 ON SCREEN DATA/BATTERY SCHEMATIC DIAGRAM


FROM/TO TIMER CN4
CN1
NC 7
GND 6
BATT 4.5V 5
UN SW 5V 4
PLL/OS CLK 3
PLL/OS DATA 2
OS CE 1
C1 47/16
C2 0.01
L1 100
C8 0.01
BATTx3
B2
Q51 DTC114EF
C51 47/16
R51 1K
BUZ1
R56 1K
TP GND
R4 100K
R1 1K
IC1 IC-PST5234-2
RST
R2
R3 2.7K
D2 LTZ-MR15
TP1
C7 47/16
C3 10/16
C4 10/16
R5 560
C9 47/16
FROM/TO SERVO/SYSCON
CN2
MAIN CN3
GND 8
VIDEO IN 7
GND 6
VIDEO OUT 5
VOB 4
BUZ D 3
GND 2
SW 5V 1
M. CTL CN15
R6 10K
C5 100/10
D1 1SS133
R7 2.2K
Q2 2SD636QRS
D3 1SS133
D4 1SS133
R11 10K
R12 5.6K
R14 680
R15 0R0
B1
C6 40P
FROM/TO DISPLAY CN6
CN3
R8 3.3K
BRT HIGH 3
TD BRT CTL 2
BRT LOW 1
R9 2.2K
R10 820
Q1 2SA933S (RS)
C13 560P
R13 10K
C14 0.01
D5
1SS133
CN101
CN102
7 4 OSD/BATT 1
VIDEO IN
TD B CTL
VIDEO OUT
GND (SG)
UN SW 5V
CE
S-CLK
S-DATA
GND (UN SW)
VOB
DOT CLK1
DOT CLK2
RESET
B102
B101
IC101 MB89010A-108
Vcc
RESET
CB
CE
S-CLK
S-DATA
PLVL
BLVL
V IN
CLVL
VOM
TEST 1
TEST 2
VOC
VOS
H-SYNC
V-SYNC
Xsc
EXsc
X
EX
Vss
R101 4.7K
R102 1K
R103 1K
R104 1K
R105 1K
R107 2.2K
R106 4.7K
R108 1K
L101 18
C105 15P
C106 56P
R109 2.2K
TP101
R110 10K
R111 1K
C101 47/16
C102 0.01
C103 3.3/16
C104 0.01
L102 10
C109 10/16
C110 0.01
IC102 BU4013B
Q
Q
CLK
RST
DATA
SET
GND
Vcc
CLK
RST
DATA
SET
R115 270
CF101
C111 0.0015
R112 470
R113 1.8K
R114 150K
C107 3.3/25
C108 100P
Q101 2SA1309R, S
C116 1/50
R116 1.5K
IC103 M52684P
S-SEP
OSC1
OSC2
OSC3
Vcc
AFC
F
S-OUT
GND
YR1
YR1
YR2
YF
YD
C115 0.0022
R117 10K
R118 10K
Q102 DTC114EF
C112 22P
C113 0.01
C114 0.01
7 5 OSD/BATT 2

## 4.29 ON SCREEN DATA/BATTERY CIRCUIT BOARD

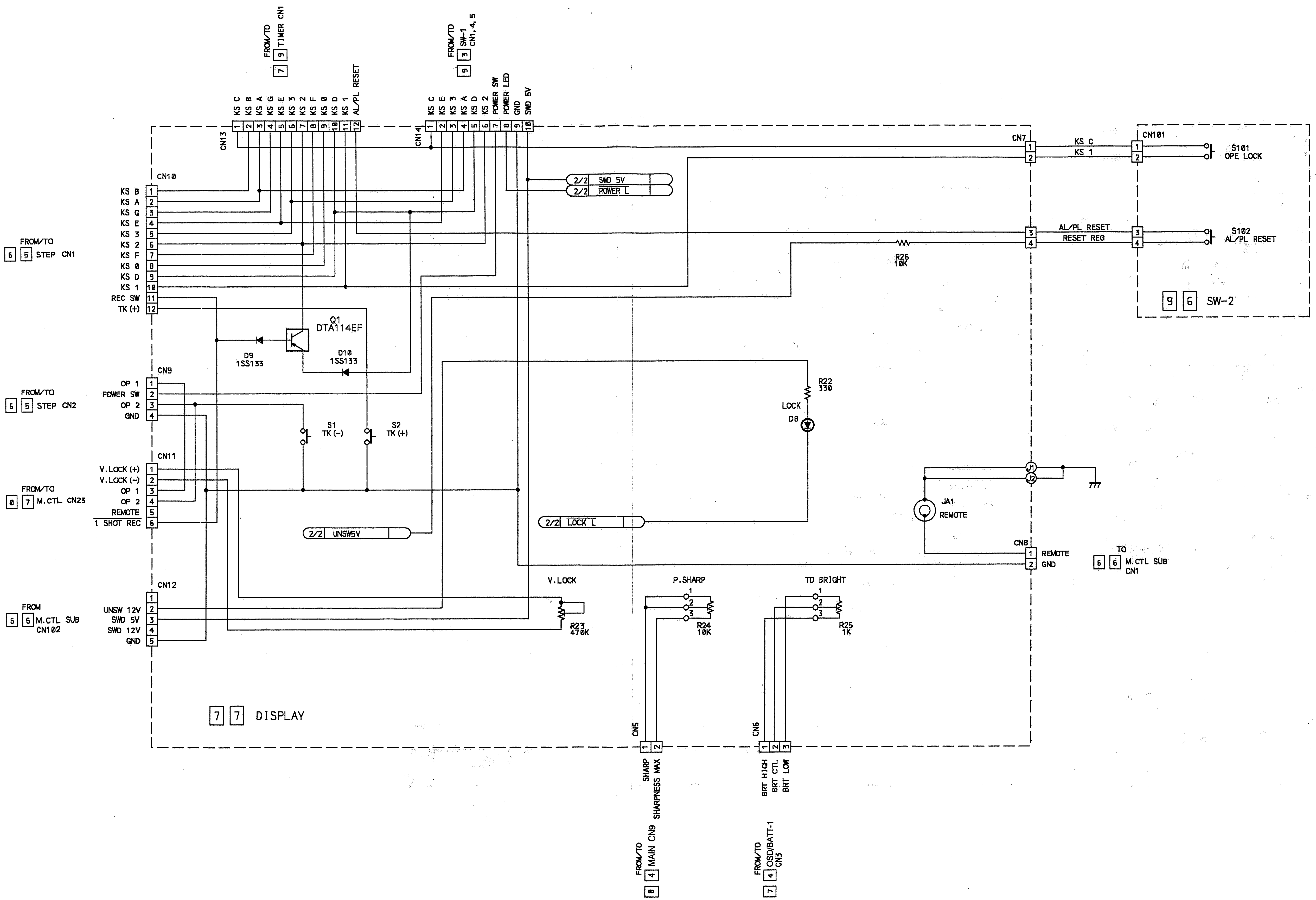
— OSD/BATT 2 — — OSD/BATT 1 —


PRK20142 OSD/BAT PWB
PRK20142 A1 OSD/BAT PWB1 ASS'Y
PRK20142 A2 OSD/BAT PWB2 ASS'Y
7
4
7
5
IC1
IC101
IC102
IC103
Q1
Q2
Q51
Q101
Q102
CN1
CN2
CN3
CN101
CN102
CN103
BUZ1
TP1
TPG
TP101
CF101
L1
L101
L102
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C51
C101
C102
C103
C104
C105
C106
C107
C108
C109
C110
C111
C112
C113
C114
C115
C116
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R51
R56
R109
R111
R112
R113
R114
R115
R116
R117
R118
D1
D2
D3
D4
D5
B1
B2
B3
B4
B5
B6
B7
B8
B9
B20
B21
B22
B23
B24
B25
B26
B101
B102
B103
B104
B105
B106
B107
B108
B109
B110
B111
B112
B113
B114
B115
A
2

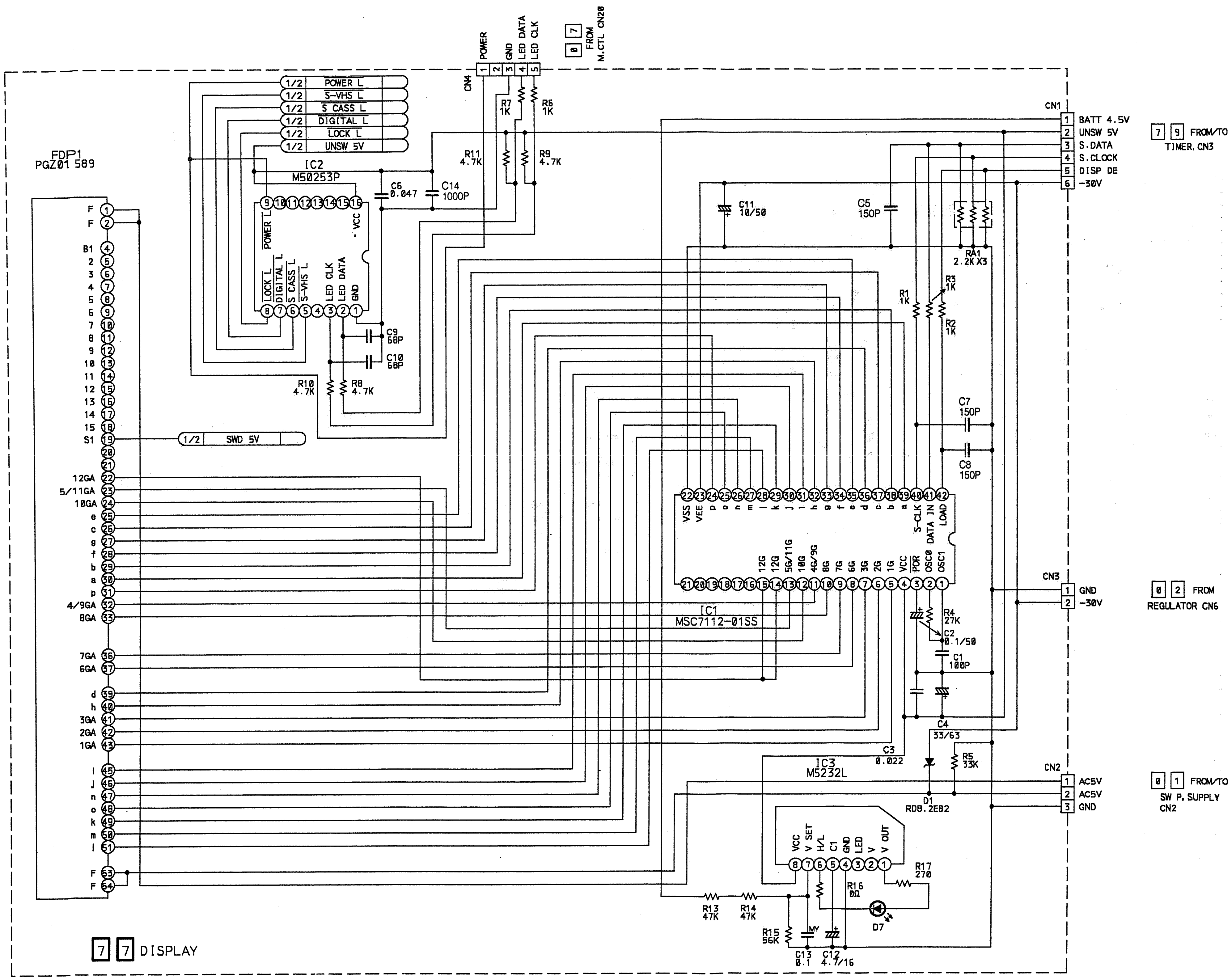
## — ON SCREEN DATA/BATTERY Voltage —

| SYMBOL | No. | REC | PB |
|---|---|---|---|
| INTEGRATED CIRCUIT | | | |
| IC1 | 1 | 4.4 | 4.4 |
| | 2 | 0.0 | 0.0 |
| | 3 | 4.4 | 4.4 |
| IC101 | 1 | 4.0 | 4.0 |
| | 2 | 4.0 | 4.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 4.4 | 4.4 |
| | 5 | 3.4 | 3.4 |
| | 6 | 4.5 | 4.5 |
| | 7 | 2.4 | 2.4 |
| | 8 | 2.2 | 2.2 |
| | 9 | 2.3 | 2.3 |
| | 10 | 2.3 | 2.3 |
| | 11 | 0.0 | 0.0 |
| | 12 | 0.7 | 0.7 |
| | 13 | 1.2 | 1.2 |
| | 14 | 0.7 | 0.7 |
| | 15 | 0.6 | 0.6 |
| | 16 | 2.2 | 2.2 |
| | 17 | 1.5 | 1.5 |
| | 18 | 4.4 | 4.4 |
| | 19 | 0.1 | 0.1 |
| | 20 | 4.5 | 4.5 |
| | 21 | 4.4 | 4.4 |
| | 22 | 4.5 | 4.5 |
| IC102 | 1 | 0.0 | 0.0 |
| | 2 | 4.4 | 4.4 |
| | 3 | 3.4 | 3.4 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| | 8 | 0.0 | 0.0 |
| | 9 | 4.4 | 4.4 |
| | 10 | 0.0 | 0.0 |
| | 11 | 0.1 | 0.1 |
| | 12 | 4.5 | 4.5 |
| | 13 | 0.0 | 0.0 |
| | 14 | 4.4 | 4.4 |
| IC103 | 1 | 1.0 | 1.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.9 | 0.9 |
| | 4 | 0.9 | 0.9 |
| | 5 | 2.2 | 2.2 |
| | 6 | 0.2 | 0.2 |
| | 7 | 3.6 | 3.6 |
| | 8 | 3.4 | 3.4 |
| | 9 | 2.3 | 2.3 |
| | 10 | 4.4 | 4.4 |
| | 11 | 1.8 | 1.8 |
| | 12 | 1.8 | 1.8 |
| | 13 | 2.4 | 2.4 |
| | 14 | 2.7 | 2.7 |
| TRANSISTOR | | | |
| Q1 | B | 0.6 | 0.6 |
| | C | 0.0 | 0.0 |
| | E | 1.2 | 1.2 |
| Q51 | B | 0.0 | 0.0 |
| | C | 5.1 | 5.1 |
| | E | 0.0 | 0.0 |
| Q101 | B | 0.6 | 0.6 |
| | C | 0.0 | 0.0 |
| | E | 1.3 | 1.3 |
| Q102 | B | 3.6 | 3.6 |
| | C | 0.1 | 0.1 |
| | E | 0.0 | 0.0 |
| CONNECTOR | | | |
| CN1 | 1 | 0.0 | 0.0 |
| | 2 | 2.0 | 2.0 |
| | 3 | 4.3 | 4.3 |
| | 4 | 4.8 | 4.8 |
| | 5 | 4.3 | 4.3 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| CN2 | 1 | 5.1 | 5.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| CN2 | 4 | 0.0 | 0.0 |
| | 5 | 1.3 | 1.3 |
| | 6 | 0.0 | 0.0 |
| | 7 | 1.4 | 1.4 |
| | 8 | 0.0 | 0.0 |
| CN3 | 1 | 0.6 | 0.6 |
| | 2 | 1.3 | 1.3 |
| | 3 | 1.4 | 1.4 |
| CN101 | 1 | 0.0 | 0.0 |
| | 2 | 2.4 | 2.4 |
| | 3 | 3.5 | 3.5 |
| | 4 | 0.1 | 0.1 |
| | 5 | 4.5 | 4.5 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.7 | 0.7 |
| | 8 | 1.2 | 1.2 |
| | 9 | 0.7 | 0.7 |
| CN102 | 1 | 4.4 | 4.4 |
| | 2 | 0.0 | 0.0 |
| | 3 | 2.3 | 2.3 |
| | 4 | 4.4 | 4.4 |

## 4.30 DISPLAY & SW-2 SCHEMATIC DIAGRAM (1/2)


FROM/TO 7 9 TIMER CN1
FROM/TO 9 3 SW-1 CN1, 4, 5
CN13
KS C
KS B
KS A
KS G
KS E
KS 3
KS 2
KS F
KS 0
KS D
KS 1
AL/PL RESET
CN14
KS C
KS E
KS 3
KS A
KS D
KS 2
POWER SW
POWER LED
GND
SWD 5V
CN10
KS B
KS A
KS G
KS E
KS 3
KS 2
KS F
KS 0
KS D
KS 1
REC SW
TK (+)
FROM/TO 6 5 STEP CN1
2/2 SWD 5V
2/2 POWER L
CN7
KS C
KS 1
AL/PL RESET
RESET REG
R26 10K
CN101
S101 OPE LOCK
S102 AL/PL RESET
9 6 SW-2
Q1 DTA114EF
D9 1SS133
D10 1SS133
CN9
OP 1
POWER SW
OP 2
GND
FROM/TO 6 5 STEP CN2
S1 TK (−)
S2 TK (+)
R22 330
LOCK D8
CN11
V.LOCK (+)
V.LOCK (−)
OP 1
OP 2
REMOTE
1 SHOT REC
FROM/TO 0 7 M.CTL CN23
J1
J2
JA1 REMOTE
2/2 LOCK L
2/2 UNSW5V
CN8
REMOTE
GND
TO 6 6 M.CTL SUB CN1
CN12
UNSW 12V
SWD 5V
SWD 12V
GND
FROM 6 6 M.CTL SUB CN102
V.LOCK
R23 470K
P.SHARP
R24 10K
TD BRIGHT
R25 1K
7 7 DISPLAY
CN5
SHARP
SHARPNESS MAX
FROM/TO 0 4 MAIN CN9
CN6
BRT HIGH
BRT CTL
BRT LOW
FROM/TO 7 4 OSD/BATT-1 CN3

## DISPLAY SCHEMATIC DIAGRAM (2/2)


FDP1
PGZ01 589
IC1
MSC7112-01SS
IC2
M50253P
IC3
M5232L
CN1
BATT 4.5V
UNSW 5V
S.DATA
S.CLOCK
DISP DE
-30V
7 9 FROM/TO TIMER. CN3
CN3
GND
-30V
0 2 FROM REGULATOR CN6
CN2
AC5V
AC5V
GND
0 1 FROM/TO SW P. SUPPLY CN2
CN4
POWER
GND
LED DATA
LED CLK
0 7 FROM M.CTL CN20
1/2 POWER L
1/2 S-VHS L
1/2 S CASS L
1/2 DIGITAL L
1/2 LOCK L
1/2 UNSW 5V
1/2 SWD 5V
R7 1K
R6 1K
R11 4.7K
R9 4.7K
R10 4.7K
R8 4.7K
C6 0.047
C14 1000P
C9 68P
C10 68P
C11 10/50
C5 150P
RA1 2.2K X3
R3 1K
R1 1K
R2 1K
C7 150P
C8 150P
R4 27K
C2 0.1/50
C1 100P
C4 33/63
R5 33K
C3 0.022
D1 RD8.2EB2
R17 270
R16 8Ω
D7
R13 47K
R14 47K
R15 56K
C13 0.1
C12 4.7/16
7 7 DISPLAY

## — DISPLAY Voltage —

| Symbol No. | | REC | PB |
|---|---|---|---|
| INTEGRATED CIRCUIT | | | |
| IC1 | 1 | 2.3 | 2.3 |
| | 2 | 2.3 | 2.3 |
| | 3 | 4.8 | 4.8 |
| | 4 | 4.8 | 4.8 |
| | 5 | -26.2 | -26.4 |
| | 6 | -26.2 | -26.4 |
| | 7 | -26.2 | -26.4 |
| | 8 | -26.2 | -26.4 |
| | 9 | -26.2 | -26.4 |
| | 10 | -26.2 | -26.4 |
| | 11 | -26.2 | -26.4 |
| | 12 | -26.2 | -26.4 |
| | 13 | -26.2 | -26.4 |
| | 14 | -23.6 | -23.7 |
| | 15 | -23.6 | -23.7 |
| | 16 | NC | NC |
| | 17 | NC | NC |
| | 18 | NC | NC |
| | 19 | NC | NC |
| | 20 | NC | NC |
| | 21 | NC | NC |
| | 22 | 0.0 | 0.0 |
| | 23 | -29.5 | -30.0 |
| | 24 | -28.9 | -29.1 |
| | 25 | -26.2 | -26.3 |
| | 26 | -20.5 | -17.9 |
| | 27 | -23.3 | -17.8 |
| | 28 | -20.5 | -17.8 |
| | 29 | -17.7 | -17.8 |
| | 30 | -17.7 | -17.9 |
| | 31 | -23.4 | -17.8 |
| | 32 | -20.6 | -15.1 |
| | 33 | -23.4 | -17.9 |
| | 34 | -12.1 | -15.1 |
| | 35 | -20.6 | -17.8 |
| | 36 | -23.4 | -23.5 |
| | 37 | -12.2 | -12.2 |
| | 38 | -9.4 | -9.4 |
| | 39 | -9.4 | -9.4 |
| | 40 | — | 0.6 |
| | 41 | — | 3.7 |
| | 42 | 0.0 | 0.0 |
| IC2 | 1 | 0.0 | 0.0 |
| | 2 | 0.9 | 0.9 |
| | 3 | 1.0 | 1.0 |
| | 4 | NC | NC |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| | 8 | 10.8 | 10.8 |
| | 9 | 0.3 | 0.4 |
| | 10 | NC | NC |
| | 11 | NC | NC |
| | 12 | NC | NC |
| | 13 | NC | NC |
| | 14 | NC | NC |
| | 15 | NC | NC |
| | 16 | 4.8 | 4.8 |
| IC3 | 1 | 3.5 | 3.6 |
| | 2 | NC | NC |
| | 3 | NC | NC |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 2.2 | 2.2 |
| | 7 | 1.7 | 1.7 |
| | 8 | 4.8 | 4.8 |
| TRANSISTOR | | | |
| Q1 | B | 4.0 | 4.0 |
| | C | 2.1 | 2.5 |
| | E | 4.0 | 4.0 |
| CONNECTOR | | | |
| CN1 | 1 | -30.0 | -30.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | — | — |
| | 4 | — | — |
| | 5 | 4.8 | 4.8 |
| | 6 | 4.6 | 4.6 |
| CN2 | 1 | -21.7 | -21.8 |
| | 2 | -21.6 | -21.7 |
| | 3 | 0.0 | 0.0 |

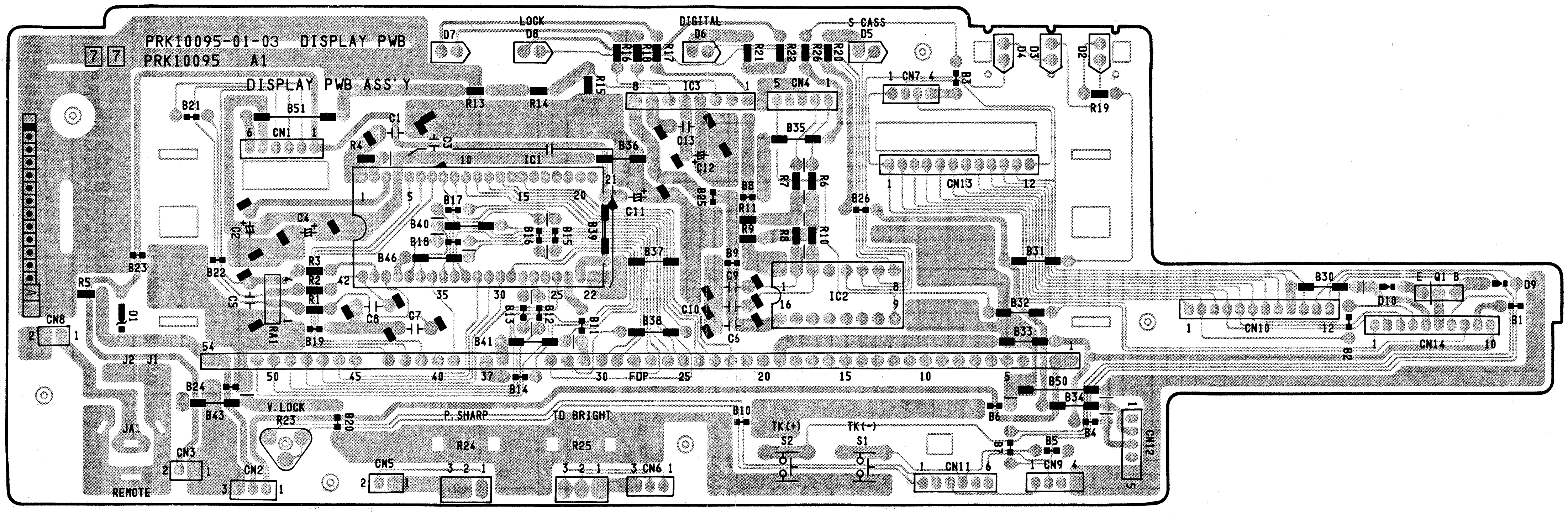
| Symbol No. | | REC | PB |
|---|---|---|---|
| CN3 | 1 | 0.0 | 0.0 |
| | 2 | -30.0 | -30.0 |
| CN4 | 1 | 0.2 | 0.1 |
| | 2 | 0.1 | 0.1 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.4 | 0.4 |
| CN5 | 1 | 3.2 | 3.2 |
| | 2 | 1.6 | 1.6 |
| CN6 | 1 | 1.3 | 1.3 |
| | 2 | 1.2 | 1.2 |
| | 3 | 0.6 | 0.6 |
| CN7 | 1 | 2.4 | 2.2 |
| | 2 | 0.0 | 0.0 |
| | 3 | -0.1 | -0.1 |
| | 4 | 4.8 | 4.8 |
| CN8 | 1 | 5.9 | 5.8 |
| | 2 | 0.0 | 0.0 |
| CN9 | 1 | 5.1 | 5.0 |
| | 2 | 5.1 | 5.0 |
| | 3 | 5.1 | 5.0 |
| | 4 | 0.0 | 0.0 |
| CN10 | 1 | 3.4 | 3.3 |
| | 2 | 3.1 | 3.5 |
| | 3 | 1.5 | 2.0 |
| | 4 | 1.5 | 1.4 |
| | 5 | 0.0 | 0.0 |
| | 6 | 2.5 | 2.1 |
| | 7 | 1.5 | 1.4 |
| | 8 | 0.0 | 0.0 |
| | 9 | 1.0 | 1.0 |
| | 10 | 0.0 | 0.0 |
| | 11 | 3.7 | 3.8 |
| | 12 | 5.0 | 5.0 |
| CN11 | 1 | 0.8 | 0.9 |
| | 2 | 2.7 | 3.0 |
| | 3 | 5.1 | 5.0 |
| | 4 | 5.1 | 5.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 3.7 | 3.8 |
| CN12 | 1 | 0.0 | 0.0 |
| | 2 | 12.4 | 12.4 |
| | 3 | 5.4 | 5.4 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| CN13 | 1 | 2.8 | 2.2 |
| | 2 | 3.4 | 3.3 |
| | 3 | 3.7 | 3.4 |
| | 4 | 2.0 | 2.0 |
| | 5 | 1.5 | 1.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 2.6 | 2.5 |
| | 8 | 2.0 | 1.4 |
| | 9 | 0.0 | 0.0 |
| | 10 | 1.0 | 1.0 |
| | 11 | 0.0 | 0.0 |
| | 12 | -0.1 | -0.1 |
| CN14 | 1 | 2.8 | 2.7 |
| | 2 | 2.0 | 0.9 |
| | 3 | 0.0 | 0.0 |
| | 4 | 3.3 | 3.0 |
| | 5 | 1.0 | 1.0 |
| | 6 | 2.5 | 2.5 |
| | 7 | 5.0 | 5.0 |
| | 8 | 0.4 | 0.4 |
| | 9 | 0.0 | 0.0 |
| | 10 | 5.4 | 5.4 |

6

## 4.31 DISPLAY CIRCUIT BOARD

5

4


PRK10095-01-03 DISPLAY PWB
PRK10095 A1
DISPLAY PWB ASS'Y
7 7
A
LOCK
DIGITAL
S.CASS
D7
D8
D6
D5
D4
D3
D2
R13
R14
R15
R16
R18
R17
R21
R22
R26
R20
IC3
CN4
CN7
B3
R19
B21
B51
CN1
C1
C3
R4
IC1
B36
C13
C12
B35
R7
R6
CN13
B25
B8
R11
R9
R8
R10
B26
C4
C2
B17
B40
B18
B16
B15
B39
C11
B37
B46
B23
B22
C5
R3
R2
R1
RA1
C8
C7
B13
B12
B11
B41
B38
C10
C9
C6
B9
IC2
B31
B30
Q1
D9
D10
B32
B33
CN10
CN14
B1
B2
R5
CN8
D1
J2
J1
B19
FDP
B14
B24
B43
B50
B34
B6
B4
B5
B7
V.LOCK
R23
B20
P.SHARP
R24
TD BRIGHT
R25
B10
TK(+)
S2
TK(-)
S1
CN11
CN9
CN12
JA1
CN3
CN2
REMOTE
CN5
CN6

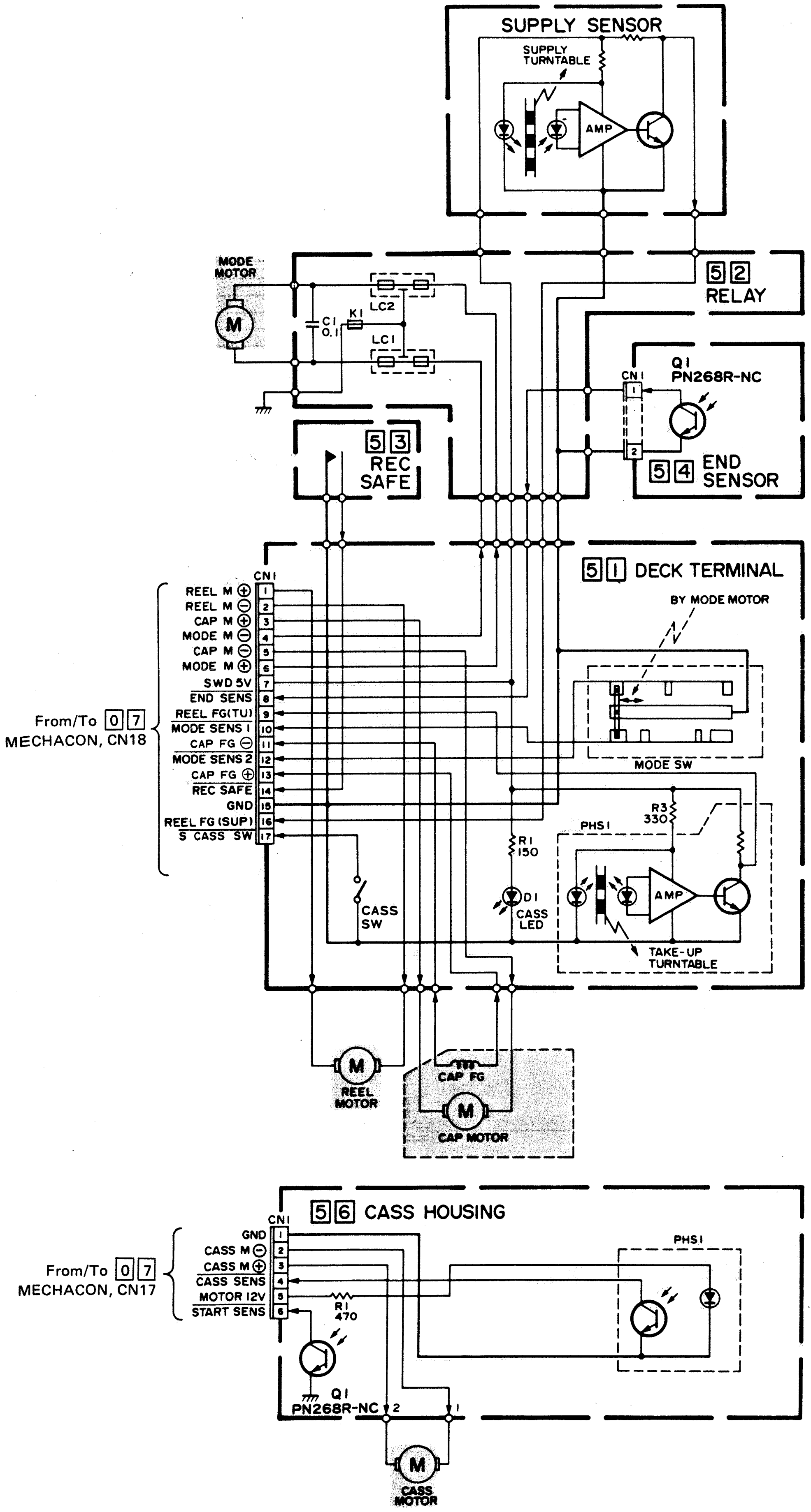
3

2

1

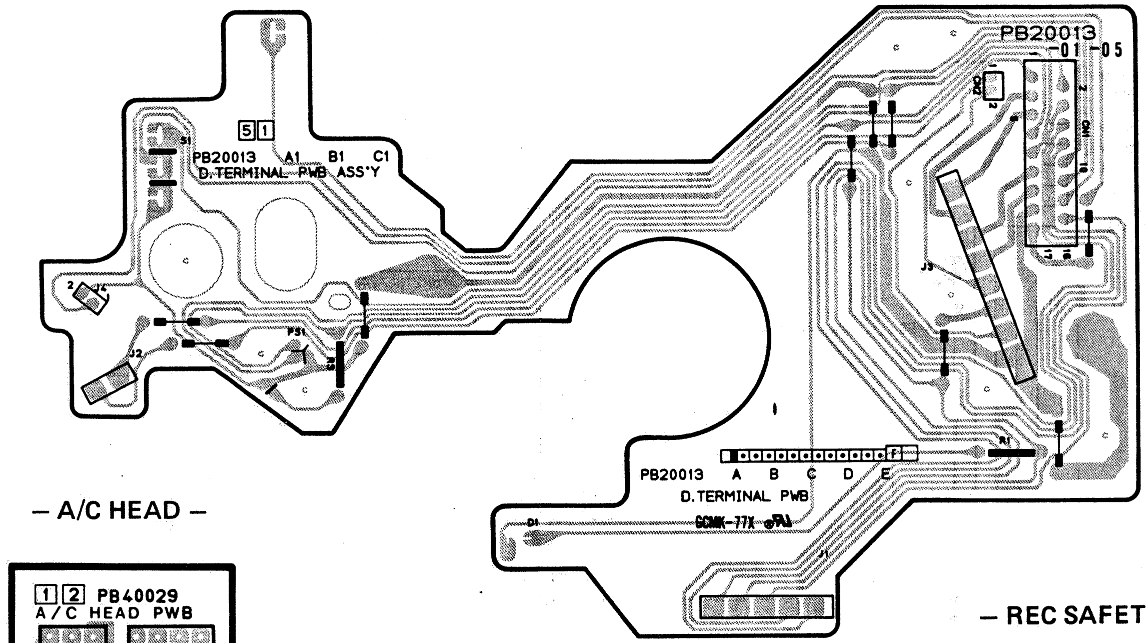
A B C E F G H

## 4.32 DECK TERMINAL SCHEMATIC DIAGRAMS

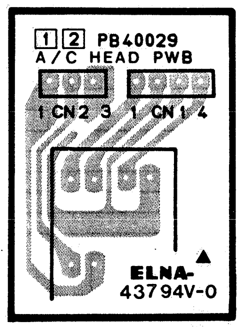

SUPPLY SENSOR
SUPPLY TURNTABLE
AMP
MODE MOTOR
M
C1 0.1
K1
LC2
LC1
52 RELAY
CN1
Q1 PN268R-NC
54 END SENSOR
53 REC SAFE
51 DECK TERMINAL
BY MODE MOTOR
MODE SW
REEL M ⊕
REEL M ⊖
CAP M ⊕
MODE M ⊖
CAP M ⊖
MODE M ⊕
SWD 5V
END SENS
REEL FG(TU)
MODE SENS 1
CAP FG ⊖
MODE SENS 2
CAP FG ⊕
REC SAFE
GND
REEL FG (SUP)
S CASS SW
From/To 07 MECHACON, CN18
R3 330
PHS1
R1 150
D1 CASS LED
CASS SW
TAKE-UP TURNTABLE
REEL MOTOR
CAP FG
CAP MOTOR
56 CASS HOUSING
GND
CASS M ⊖
CASS M ⊕
CASS SENS
MOTOR 12V
START SENS
From/To 07 MECHACON, CN17
R1 470
Q1 PN268R-NC
CASS MOTOR

## 4.33 DECK TERMINAL CIRCUIT BOARDS

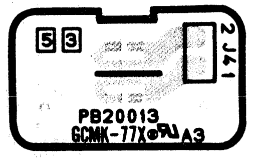
– DECK TERMINAL –


51
PB20013 A1 B1 C1
D.TERMINAL PWB ASS'Y
PB20013 -01-05
PB20013 A B C D E
D.TERMINAL PWB
GCMK-77X

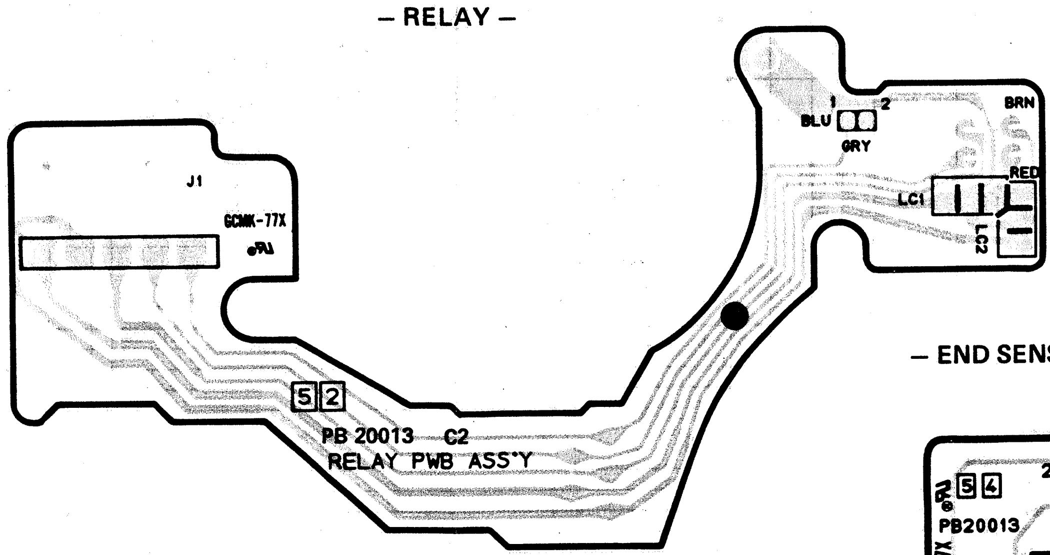
– A/C HEAD –


12 PB40029
A/C HEAD PWB
1 CN2 3
1 CN1 4
ELNA-
43794V-0

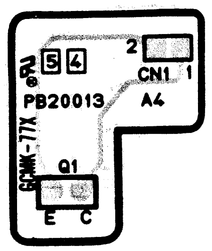
– REC SAFETY –


53
PB20013
GCMK-77X A3

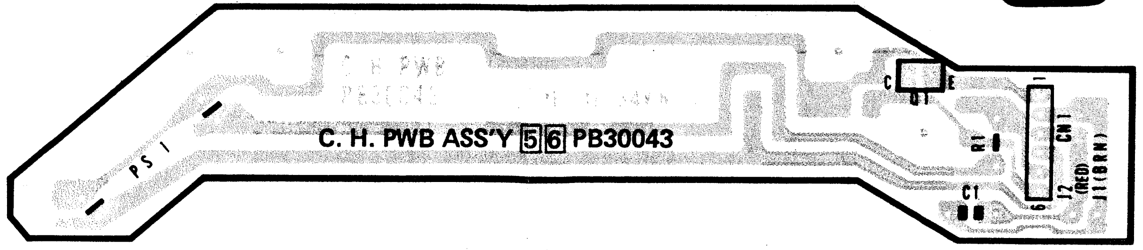
– RELAY –


J1
GCMK-77X
BLU
GRY
BRN
RED
LC1
LC2
52
PB 20013 C2
RELAY PWB ASS'Y

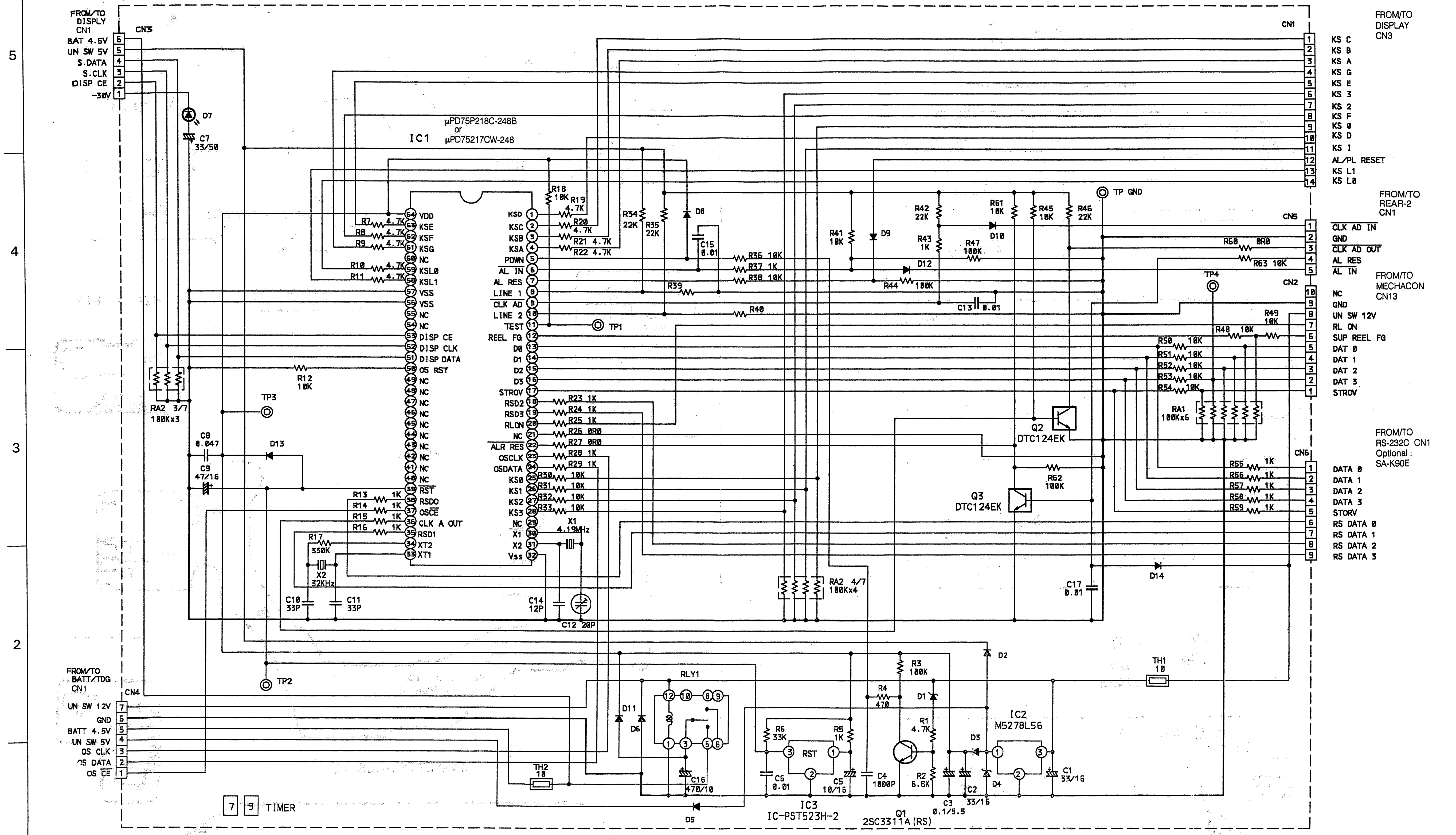
– END SENSOR –


54
PB20013 A4
CN1
GCMK-77X
Q1
E C

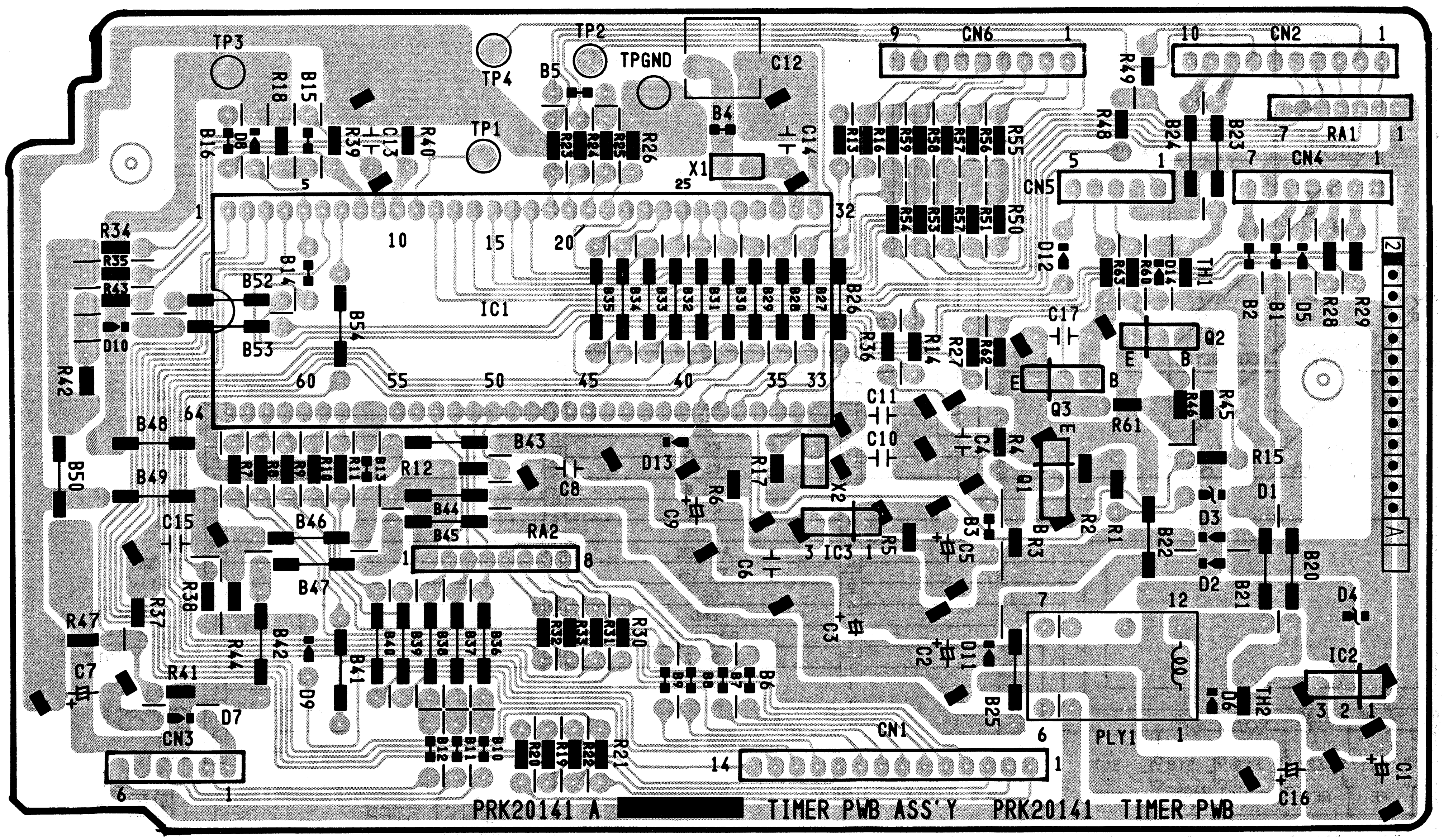
– CASSETTE HOUSING –


C. H. PWB ASS'Y 56 PB30043
PS1
Q1
R1
C1
CN1
J2 (RED)
J1 (BRN)

## 4.34 TIMER SCHEMATIC DIAGRAM


FROM/TO DISPLY CN1
CN3
BAT 4.5V
UN SW 5V
S.DATA
S.CLK
DISP CE
-30V
D7
C7 33/50
IC1
µPD75P218C-248B or µPD75217CW-248
VDD
KSE
KSF
KSG
NC
KSL0
KSL1
VSS
DISP CE
DISP CLK
DISP DATA
OS RST
RST
RSDO
OSCE
CLK A OUT
RSD1
XT2
XT1
KSD
KSC
KSB
KSA
PDWN
AL IN
AL RES
LINE 1
CLK AD
LINE 2
TEST
REEL FG
D0
D1
D2
D3
STROV
RSD2
RSD3
RLON
ALR RES
OSCLK
OSDATA
KS0
KS1
KS2
KS3
X1
X2
Vss
R7 4.7K
R8 4.7K
R9 4.7K
R10 4.7K
R11 4.7K
R12 10K
R13 1K
R14 1K
R15 1K
R16 1K
R17 330K
X2 32KHz
C10 33P
C11 33P
RA2 3/7 100Kx3
TP3
C8 0.047
C9 47/16
D13
R18 10K
R19 4.7K
R20 4.7K
R21 4.7K
R22 4.7K
R23 1K
R24 1K
R25 1K
R26 0R0
R27 0R0
R28 1K
R29 1K
R30 10K
R31 10K
R32 10K
R33 10K
X1 4.19MHz
C14 12P
C12 20P
TP1
R34 22K
R35 22K
D8
C15 0.01
R36 10K
R37 1K
R38 10K
R39
R40
RA2 4/7 100Kx4
R41 10K
D9
R42 22K
R43 1K
D12
R44 100K
R47 100K
C13 0.01
R61 10K
D10
R45 10K
R46 22K
TP GND
Q2 DTC124EK
Q3 DTC124EK
R62 100K
C17 0.01
D14
TP4
R48 10K
R49 10K
R50 10K
R51 10K
R52 10K
R53 10K
R54 10K
RA1 100Kx6
R55 1K
R56 1K
R57 1K
R58 1K
R59 1K
R60 0R0
R63 10K
CN1
KS C
KS B
KS A
KS G
KS E
KS 3
KS 2
KS F
KS 0
KS D
KS I
AL/PL RESET
KS L1
KS L0
FROM/TO DISPLAY CN3
CN5
CLK AD IN
GND
CLK AD OUT
AL RES
AL IN
FROM/TO REAR-2 CN1
CN2
NC
GND
UN SW 12V
RL ON
SUP REEL FG
DAT 0
DAT 1
DAT 2
DAT 3
STROV
FROM/TO MECHACON CN13
CN6
DATA 0
DATA 1
DATA 2
DATA 3
STORV
RS DATA 0
RS DATA 1
RS DATA 2
RS DATA 3
FROM/TO RS-232C CN1 Optional : SA-K90E
FROM/TO BATT/TDG CN1
CN4
UN SW 12V
GND
BATT 4.5V
UN SW 5V
OS CLK
OS DATA
OS CE
TP2
TH2 10
RLY1
D11
D6
C16 470/10
D5
R6 33K
R5 1K
RST
C6 0.01
C5 10/16
IC3 IC-PST523H-2
C4 1000P
R3 100K
R4 470
D1
R1 4.7K
R2 6.8K
Q1 2SC3311A (RS)
C3 0.1/5.5
C2 33/16
D2
D3
D4
IC2 M5278L56
C1 33/16
TH1 10
7 9 TIMER

## 4.35 TIMER CIRCUIT BOARD

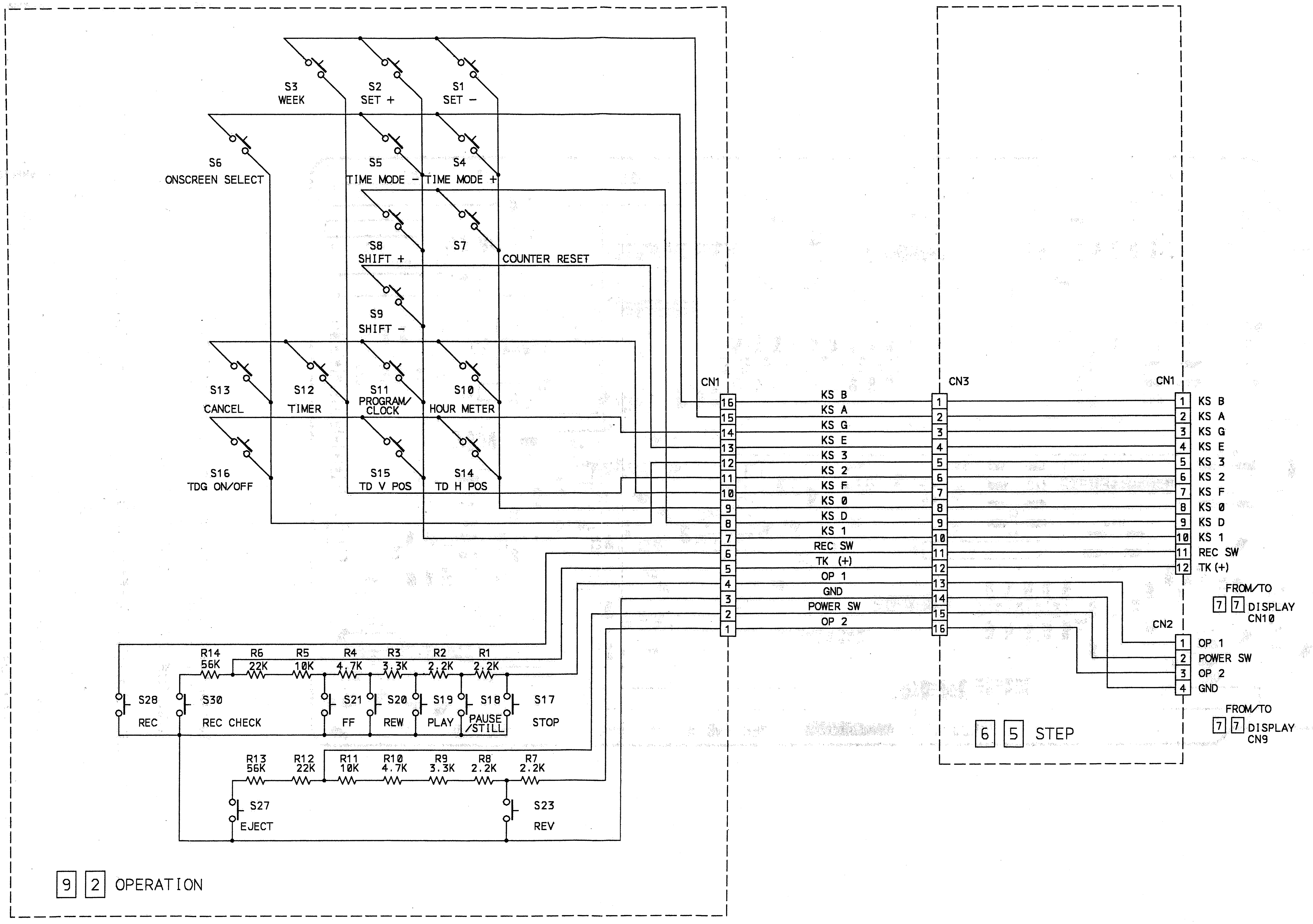

TP3
TP2
TP4
TPGND
TP1
B5
B4
C12
X1
C14
CN6
9
1
CN2
10
1
R49
R48
B24
B23
RA1
7
1
CN4
CN5
5
R18
B15
B16
D8
R39
C13
R40
R23
R24
R25
R26
R13
R16
R59
R58
R57
R56
R55
R54
R53
R57
R51
R50
D12
R63
R60
D14
TH1
B2
B1
D5
R28
R29
R34
R35
R43
D10
R42
B52
B53
B14
B54
IC1
1
10
15
20
25
32
33
35
40
45
50
55
60
64
B35
B34
B33
B32
B31
B30
B29
B28
B27
B26
R36
R14
R27
R62
C17
Q2
E
B
Q3
R61
R46
R45
C11
C10
C4
R4
Q1
R15
D1
B48
B49
B50
R7
R8
R9
R10
R11
B13
R12
B43
C8
D13
R6
R17
X2
C9
B44
B45
B46
RA2
8
C15
B47
R38
R37
R47
R44
B42
D9
B41
B40
B39
B38
B37
B36
R32
R33
R31
R30
B9
B8
B7
B6
C6
IC3
3
R5
B3
C5
R3
R2
R1
B22
D3
D2
B21
B20
D4
C3
C2
D11
B25
PLY1
12
6
D6
TH2
IC2
C7
R41
D7
CN3
6
1
B12
B11
B10
R20
R19
R22
R21
CN1
14
C16
C1
A
PRK20141 A
TIMER PWB ASS'Y PRK20141 TIMER PWB
6
5
4
3
2
1
A
B
C
D
E
F
G
H

— TIMER Voltage —

| Symbol | No. | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC1 | 1 | 1.0 | 1.0 |
| | 2 | 2.8 | 3.3 |
| | 3 | 3.4 | 3.8 |
| | 4 | 3.3 | 2.6 |
| | 5 | 0.0 | 0.0 |
| | 6 | 4.4 | 4.4 |
| | 7 | 0.0 | 0.0 |
| | 8 | 4.8 | 4.8 |
| | 9 | 4.8 | 4.8 |
| | 10 | 0.0 | 0.0 |
| | 11 | 4.9 | 4.9 |
| | 12 | - | - |
| | 13 | 1.3 | 1.3 |
| | 14 | 1.2 | 1.2 |
| | 15 | 1.2 | 1.3 |
| | 16 | 0.5 | 0.5 |
| | 17 | 2.4 | 2.4 |
| | 18 | 1.2 | 0.6 |
| | 19 | 0.0 | 0.6 |
| | 20 | 0.0 | 0.0 |
| | 21 | 0.0 | 0.0 |
| | 22 | 4.4 | 4.4 |
| | 23 | - | 4.8 |
| | 24 | - | 0.0 |
| | 25 | 0.0 | 0.0 |
| | 26 | 0.0 | 0.0 |
| | 27 | 3.0 | 2.5 |
| | 28 | 0.0 | 0.0 |
| | 29 | NC | NC |
| | 30 | 2.4 | 2.4 |
| | 31 | 2.2 | 2.2 |
| | 32 | 0.0 | 0.0 |
| | 33 | 1.3 | 1.3 |
| | 34 | 2.3 | 2.3 |
| | 35 | 0.0 | 1.1 |
| | 36 | 0.0 | 0.0 |
| | 37 | 0.0 | 4.8 |
| | 38 | 0.0 | 1.1 |
| | 39 | 4.9 | 4.9 |
| | 40 | NC | NC |
| | 41 | NC | NC |
| | 42 | NC | NC |
| | 43 | NC | NC |
| | 44 | NC | NC |
| | 45 | NC | NC |
| | 46 | NC | NC |
| | 47 | NC | NC |
| | 48 | NC | NC |
| | 49 | NC | NC |
| | 50 | 0.0 | 0.0 |
| | 51 | 4.7 | 3.7 |
| | 52 | 0.0 | 0.6 |
| | 53 | 0.0 | 0.0 |
| | 54 | NC | NC |
| | 55 | NC | NC |
| | 56 | 0.0 | 0.0 |
| | 57 | 0.0 | 0.0 |
| | 58 | 3.9 | 3.9 |
| | 59 | 2.0 | 2.3 |
| | 60 | NC | NC |
| | 61 | 1.0 | 1.5 |
| | 62 | 2.0 | 1.5 |
| | 63 | 1.5 | 1.5 |
| | 64 | 4.9 | 4.9 |
| IC2 | 1 | 5.6 | 5.6 |
| | 2 | 0.0 | 0.0 |
| | 3 | 12.3 | 12.4 |
| IC3 | 1 | 4.9 | 4.9 |
| | 2 | 0.0 | 0.0 |
| | 3 | 4.9 | 4.9 |

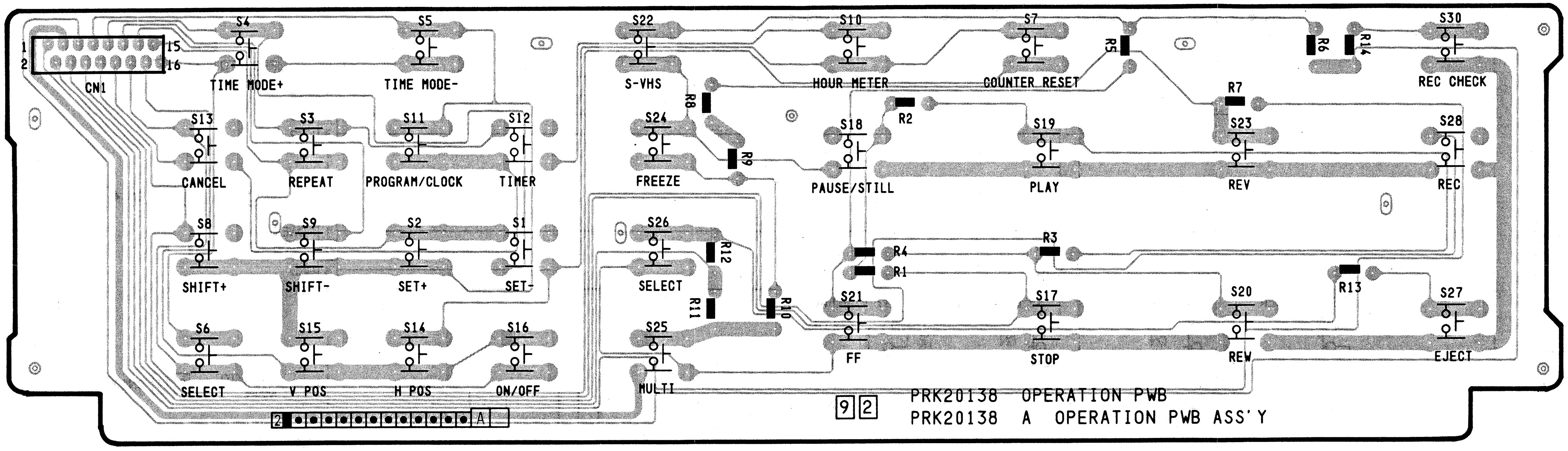
| Symbol | No. | REC | PB |
|---|---|---|---|
| **TRANSISTOR** | | | |
| Q1 | B | 0.7 | 0.7 |
| | C | 0.0 | 0.0 |
| | E | 0.0 | 0.0 |
| Q2 | B | 0.5 | 0.5 |
| | C | 4.8 | 4.8 |
| | E | 0.0 | 0.0 |
| Q3 | B | 0.0 | 0.0 |
| | C | 4.4 | 4.4 |
| | E | 0.0 | 0.0 |
| **CONNECTOR** | | | |
| CN1 | 1 | . | 3.2 |
| | 2 | . | 3.8 |
| | 3 | . | 2.6 |
| | 4 | . | 1.0 |
| | 5 | . | 1.0 |
| | 6 | . | 0.0 |
| | 7 | . | 2.5 |
| | 8 | . | 1.0 |
| | 9 | . | 0.0 |
| | 10 | . | 1.0 |
| | 11 | . | 0.0 |
| | 12 | . | -0.1 |
| | 13 | . | NC |
| | 14 | . | NC |
| CN2 | 1 | 2.2 | 2.2 |
| | 2 | 0.5 | 0.5 |
| | 3 | 0.9 | 1.1 |
| | 4 | 1.2 | 1.2 |
| | 5 | 1.3 | 1.1 |
| | 6 | - | - |
| | 7 | 0.8 | 0.8 |
| | 8 | 12.4 | 12.4 |
| | 9 | 0.0 | 0.0 |
| | 10 | NC | NC |
| CN3 | 1 | -30.0 | -30.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.3 | 0.6 |
| | 4 | 4.0 | 3.7 |
| | 5 | 4.8 | 4.8 |
| | 6 | 4.6 | 4.6 |
| CN4 | 1 | 0.0 | 4.8 |
| | 2 | - | - |
| | 3 | 3.0 | 4.9 |
| | 4 | 4.8 | 4.8 |
| | 5 | 4.6 | 4.6 |
| | 6 | 0.0 | 0.0 |
| | 7 | NC | NC |
| CN5 | 1 | 4.6 | 4.6 |
| | 2 | 0.0 | 0.0 |
| | 3 | 4.8 | 4.8 |
| | 4 | 0.0 | 0.0 |
| | 5 | 4.2 | 4.2 |
| CN6 | 1 | 1.5 | 1.5 |
| | 2 | 1.5 | 1.5 |
| | 3 | 1.2 | 1.3 |
| | 4 | 0.5 | 0.4 |
| | 5 | 2.4 | 2.4 |
| | 6 | 1.0 | 1.0 |
| | 7 | 1.0 | 1.0 |
| | 8 | 1.0 | 1.0 |
| | 9 | 0.5 | 1.0 |

## 4.36 OPERATION & STEP SCHEMATIC DIAGRAM

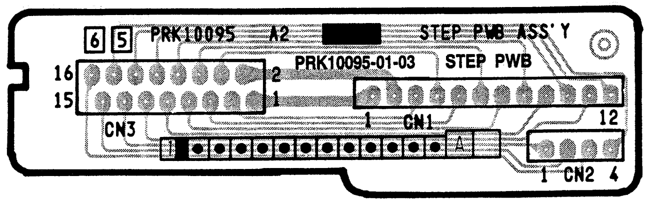

S3
WEEK
S2
SET +
S1
SET −
S6
ONSCREEN SELECT
S5
TIME MODE −
S4
TIME MODE +
S8
SHIFT +
S7
COUNTER RESET
S9
SHIFT −
S13
CANCEL
S12
TIMER
S11
PROGRAM/
CLOCK
S10
HOUR METER
S16
TDG ON/OFF
S15
TD V POS
S14
TD H POS
CN1
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
KS B
KS A
KS G
KS E
KS 3
KS 2
KS F
KS 0
KS D
KS 1
REC SW
TK (+)
OP 1
GND
POWER SW
OP 2
R14
56K
R6
22K
R5
10K
R4
4.7K
R3
3.3K
R2
2.2K
R1
2.2K
S28
REC
S30
REC CHECK
S21
FF
S20
REW
S19
PLAY
S18
PAUSE
/STILL
S17
STOP
R13
56K
R12
22K
R11
10K
R10
4.7K
R9
3.3K
R8
2.2K
R7
2.2K
S27
EJECT
S23
REV
9 2 OPERATION
CN3
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
CN1
1 KS B
2 KS A
3 KS G
4 KS E
5 KS 3
6 KS 2
7 KS F
8 KS 0
9 KS D
10 KS 1
11 REC SW
12 TK (+)
FROM/TO
7 7 DISPLAY
CN10
CN2
1 OP 1
2 POWER SW
3 OP 2
4 GND
FROM/TO
7 7 DISPLAY
CN9
6 5 STEP
6
5
4
3
2
1
A
B
C
E
F
G
H

## 4.37 OPERATION & STEP CIRCUIT BOARDS

### — OPERATION —


S4
TIME MODE+
S5
TIME MODE-
S22
S-VHS
S10
HOUR METER
S7
COUNTER RESET
R5
R6
R14
S30
REC CHECK
CN1
1
2
15
16
S13
CANCEL
S3
REPEAT
S11
PROGRAM/CLOCK
S12
TIMER
R8
S24
FREEZE
R9
S18
PAUSE/STILL
R2
S19
PLAY
R7
S23
REV
S28
REC
S8
SHIFT+
S9
SHIFT-
S2
SET+
S1
SET-
S26
SELECT
R12
R11
R10
R4
R1
R3
R13
S21
FF
S17
STOP
S20
REW
S27
EJECT
S6
SELECT
S15
V POS
S14
H POS
S16
ON/OFF
S25
MULTI
2
A
9 2
PRK20138 OPERATION PWB
PRK20138 A OPERATION PWB ASS'Y

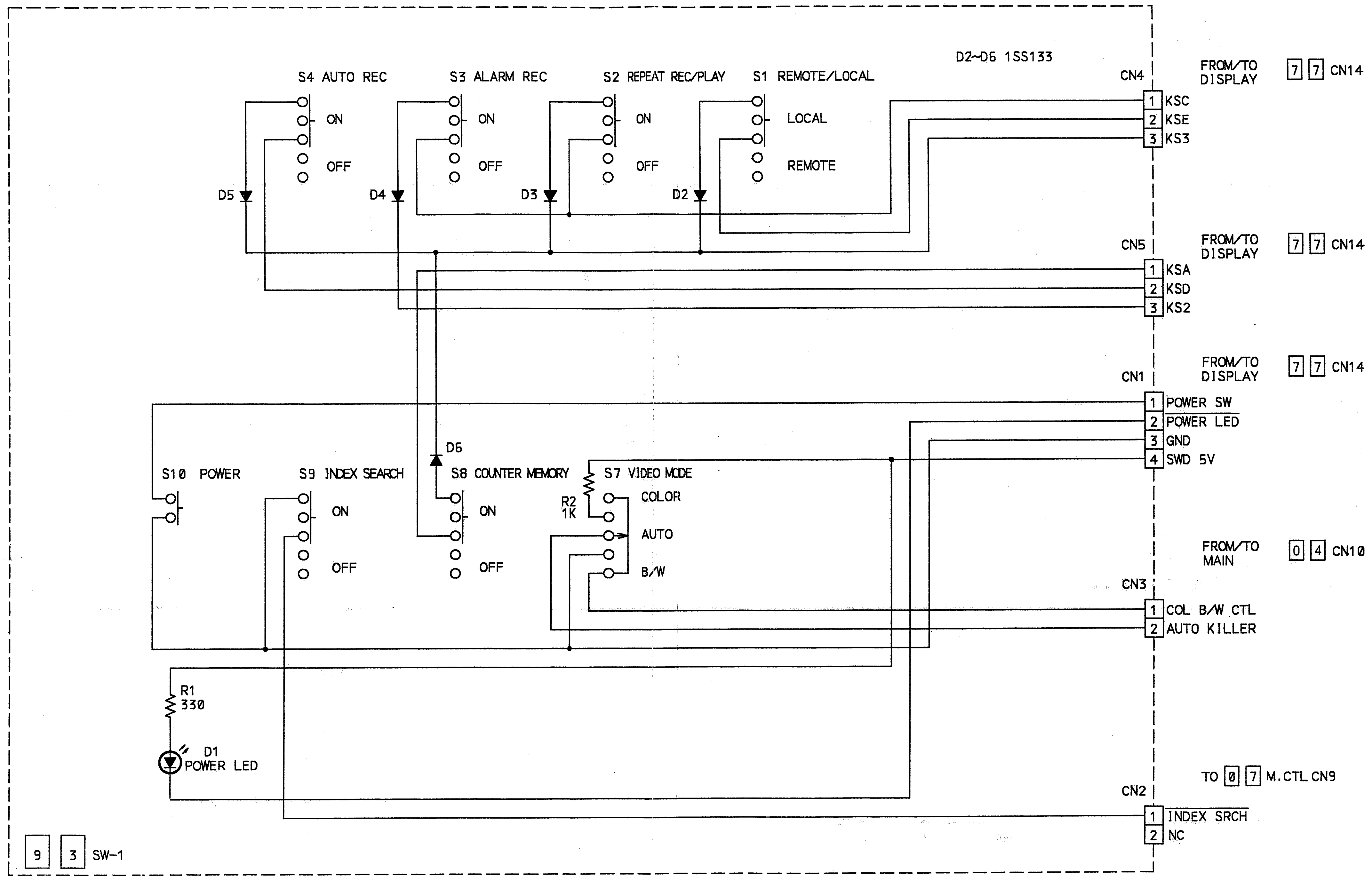
### — STEP —


6 5
PRK10095 A2
STEP PWB ASS'Y
PRK10095-01-03
STEP PWB
16
15
2
1
CN3
1
CN1
12
1
A
1 CN2 4

### — OPERATION Voltage —

| Symbol No. | | REC | PB |
|---|---|---|---|
| **CONNECTOR** | | | |
| CN1 | 1 | 5.0 | 5.0 |
| | 2 | 5.0 | 5.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 5.0 | 5.0 |
| | 5 | 5.0 | 5.0 |
| | 6 | 3.8 | 3.8 |
| | 7 | 0.0 | 0.0 |
| | 8 | 1.0 | 1.0 |
| | 9 | 0.0 | 0.0 |
| | 10 | 1.0 | 1.4 |
| | 11 | 2.6 | 2.5 |
| | 12 | 0.0 | 0.0 |
| | 13 | 2.0 | 2.4 |
| | 14 | 1.5 | 1.5 |
| | 15 | 3.0 | 3.0 |
| | 16 | 3.4 | 3.8 |

## 4.38 SW-1 SCHEMATIC DIAGRAM

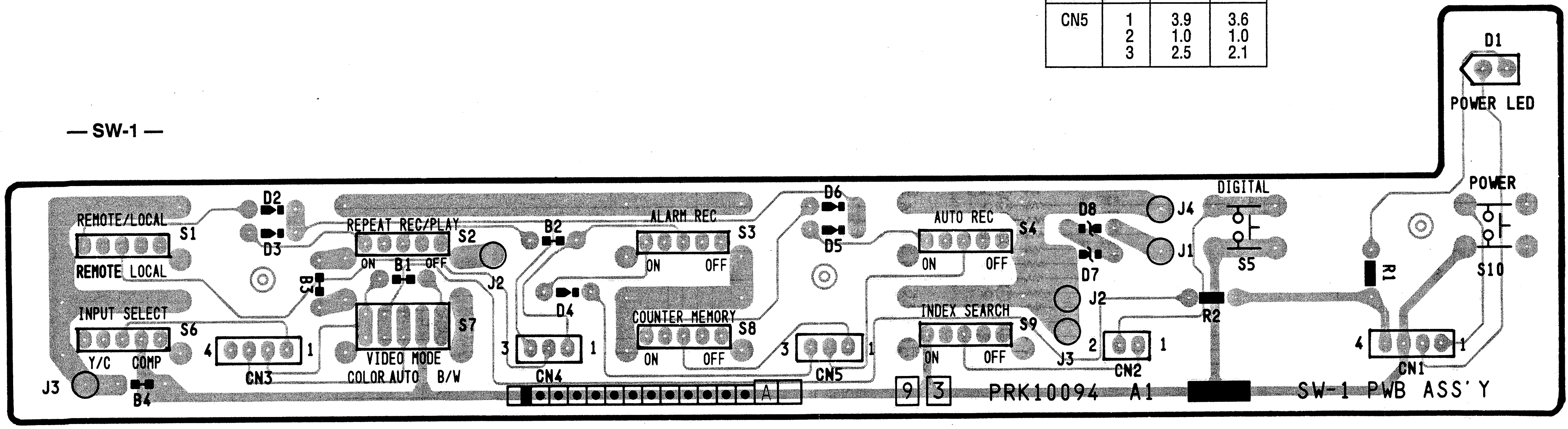

D2~D6 1SS133
S4 AUTO REC
S3 ALARM REC
S2 REPEAT REC/PLAY
S1 REMOTE/LOCAL
ON
OFF
LOCAL
REMOTE
D5
D4
D3
D2
CN4
FROM/TO DISPLAY
7 7 CN14
1 KSC
2 KSE
3 KS3
CN5
1 KSA
2 KSD
3 KS2
CN1
1 POWER SW
2 POWER LED
3 GND
4 SWD 5V
D6
S10 POWER
S9 INDEX SEARCH
S8 COUNTER MEMORY
S7 VIDEO MODE
R2 1K
COLOR
AUTO
B/W
FROM/TO MAIN
0 4 CN10
CN3
1 COL B/W CTL
2 AUTO KILLER
R1 330
D1 POWER LED
TO 0 7 M.CTL CN9
CN2
1 INDEX SRCH
2 NC
9 3 SW-1

## 4.39 SW-1 & SW-2 CIRCUIT BOARDS

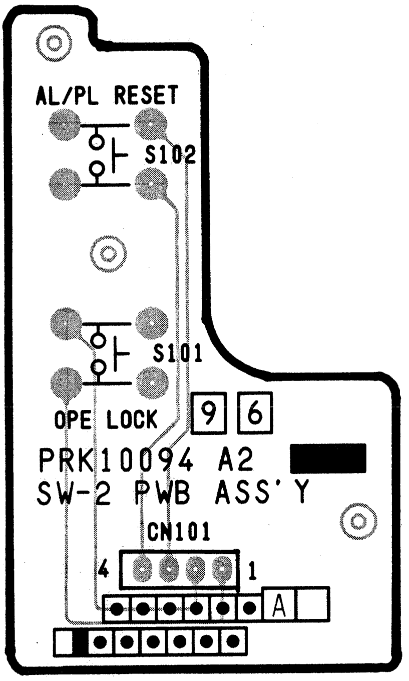
**— SWITCH Voltage —**

| Symbol No. | | REC | PB |
|---|---|---|---|
| **CONNECTOR** | | | |
| CN1 | 1 | 5.0 | 5.0 |
| | 2 | 0.4 | 0.4 |
| | 3 | 0.0 | 0.0 |
| | 4 | 5.4 | 5.4 |
| CN2 | 1 | 5.0 | 5.0 |
| | 2 | NC | NC |
| CN3 | 1 | 2.0 | 2.0 |
| | 2 | 2.0 | 2.0 |
| CN4 | 1 | 2.8 | 2.8 |
| | 2 | 2.0 | 2.0 |
| | 3 | 0.0 | 0.0 |
| CN5 | 1 | 3.9 | 3.6 |
| | 2 | 1.0 | 1.0 |
| | 3 | 2.5 | 2.1 |

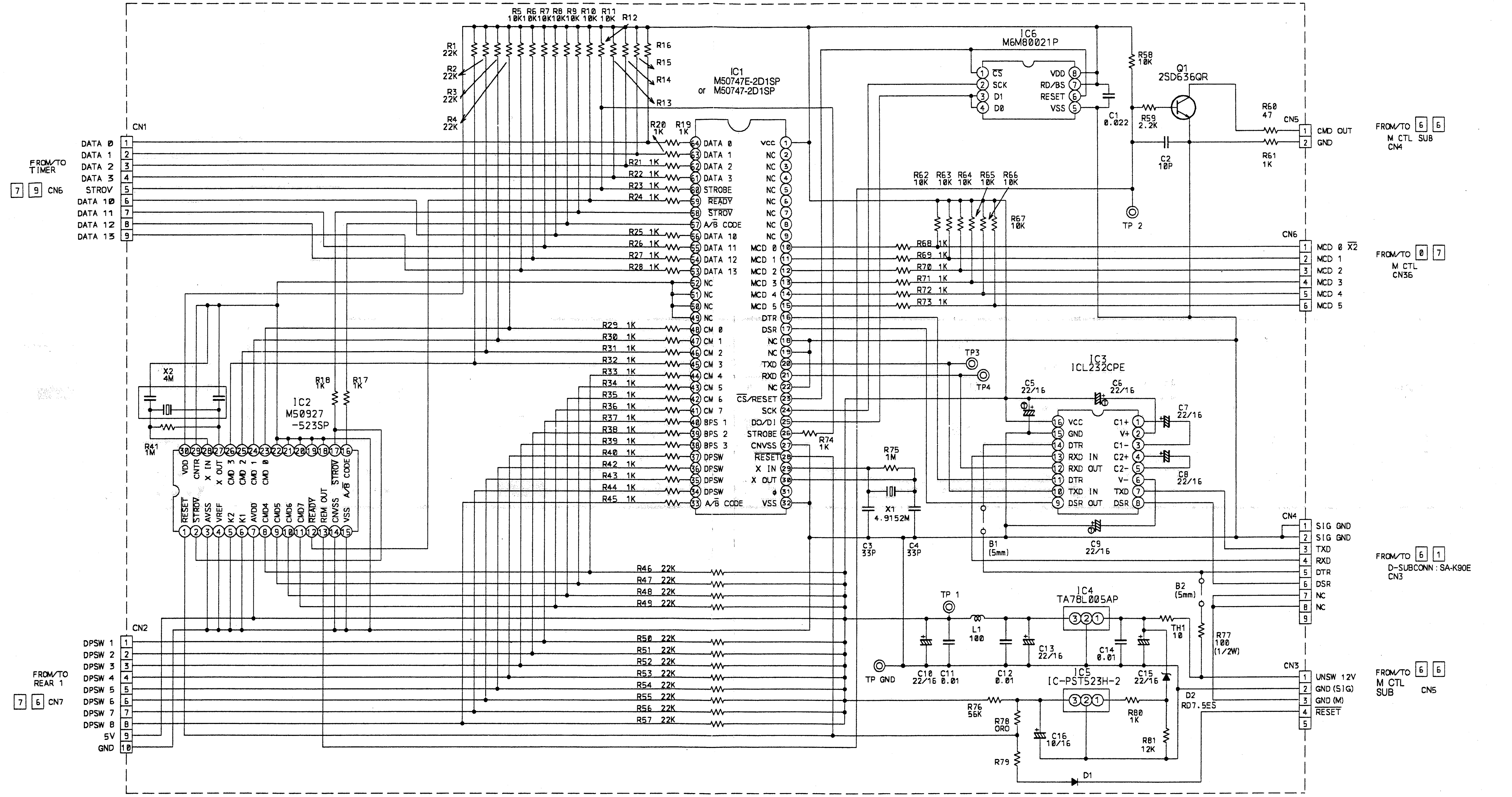
**— SW-1 —**


REMOTE/LOCAL
S1
REMOTE LOCAL
D2
D3
REPEAT REC/PLAY
S2
ON B1 OFF
B3
B2
J2
ALARM REC
S3
ON OFF
D6
D5
AUTO REC
S4
ON OFF
D8
D7
J4
J1
DIGITAL
S5
D1
POWER LED
POWER
S10
R1
R2
J2
J3
INPUT SELECT
S6
Y/C COMP
J3
B4
4 CN3 1
VIDEO MODE
COLOR AUTO B/W
S7
D4
3 CN4 1
COUNTER MEMORY
S8
ON OFF
3 CN5 1
INDEX SEARCH
S9
ON OFF
2 CN2 1
4 CN1 1
A
9 3
PRK10094 A1
SW-1 PWB ASS'Y

**— SW-2 —**


AL/PL RESET
S102
S101
OPE LOCK
9 6
PRK10094 A2
SW-2 PWB ASS'Y
CN101
4 1
A

## 4.40 RS-232C SCHEMATIC DIAGRAM : SA-K90E


FROM/TO TIMER
7 9 CN6
CN1
DATA 0
DATA 1
DATA 2
DATA 3
STROV
DATA 10
DATA 11
DATA 12
DATA 13
R1 22K
R2 22K
R3 22K
R4 22K
R5 R6 R7 R8 R9 R10 R11
10K 10K 10K 10K 10K 10K 10K
R12
R13
R14
R15
R16
R19 1K
R20 1K
R21 1K
R22 1K
R23 1K
R24 1K
R25 1K
R26 1K
R27 1K
R28 1K
IC1
M50747E-2D1SP
or M50747-2D1SP
IC6
M6M80021P
CS
SCK
DI
D0
VDD
RD/BS
RESET
VSS
C1 0.022
R58 10K
Q1 2SD636QR
R59 2.2K
C2 10P
R60 47
R61 1K
TP 2
CN5
CMD OUT
GND
FROM/TO 6 6
M CTL SUB
CN4
R62 R63 R64 R65 R66
10K 10K 10K 10K 10K
R67 10K
R68 1K
R69 1K
R70 1K
R71 1K
R72 1K
R73 1K
CN6
MCD 0 X2
MCD 1
MCD 2
MCD 3
MCD 4
MCD 5
FROM/TO 0 7
M CTL
CN36
X2 4M
R41 1M
IC2
M50927
-523SP
R18 1K
R17 1K
R29 1K
R30 1K
R31 1K
R32 1K
R33 1K
R34 1K
R35 1K
R36 1K
R37 1K
R38 1K
R39 1K
R40 1K
R42 1K
R43 1K
R44 1K
R45 1K
TP3
TP4
R74 1K
R75 1M
X1 4.9152M
C3 33P
C4 33P
IC3
ICL232CPE
C5 22/16
C6 22/16
C7 22/16
C8 22/16
C9 22/16
B1 (5mm)
CN4
SIG GND
SIG GND
TXD
RXD
DTR
DSR
NC
NC
FROM/TO 6 1
D-SUBCONN : SA-K90E
CN3
R46 22K
R47 22K
R48 22K
R49 22K
R50 22K
R51 22K
R52 22K
R53 22K
R54 22K
R55 22K
R56 22K
R57 22K
CN2
DPSW 1
DPSW 2
DPSW 3
DPSW 4
DPSW 5
DPSW 6
DPSW 7
DPSW 8
5V
GND
FROM/TO REAR 1
7 6 CN7
TP 1
L1 100
IC4
TA78L005AP
B2 (5mm)
TH1 10
R77 100 (1/2W)
TP GND
C10 22/16
C11 0.01
C12 0.01
C13 22/16
C14 0.01
C15 22/16
IC5
IC-PST523H-2
D2
RD7.5ES
R76 56K
R78 0R0
R80 1K
R81 12K
C16 10/16
R79
D1
CN3
UNSW 12V
GND (SIG)
GND (M)
RESET
FROM/TO 6 6
M CTL SUB
CN5

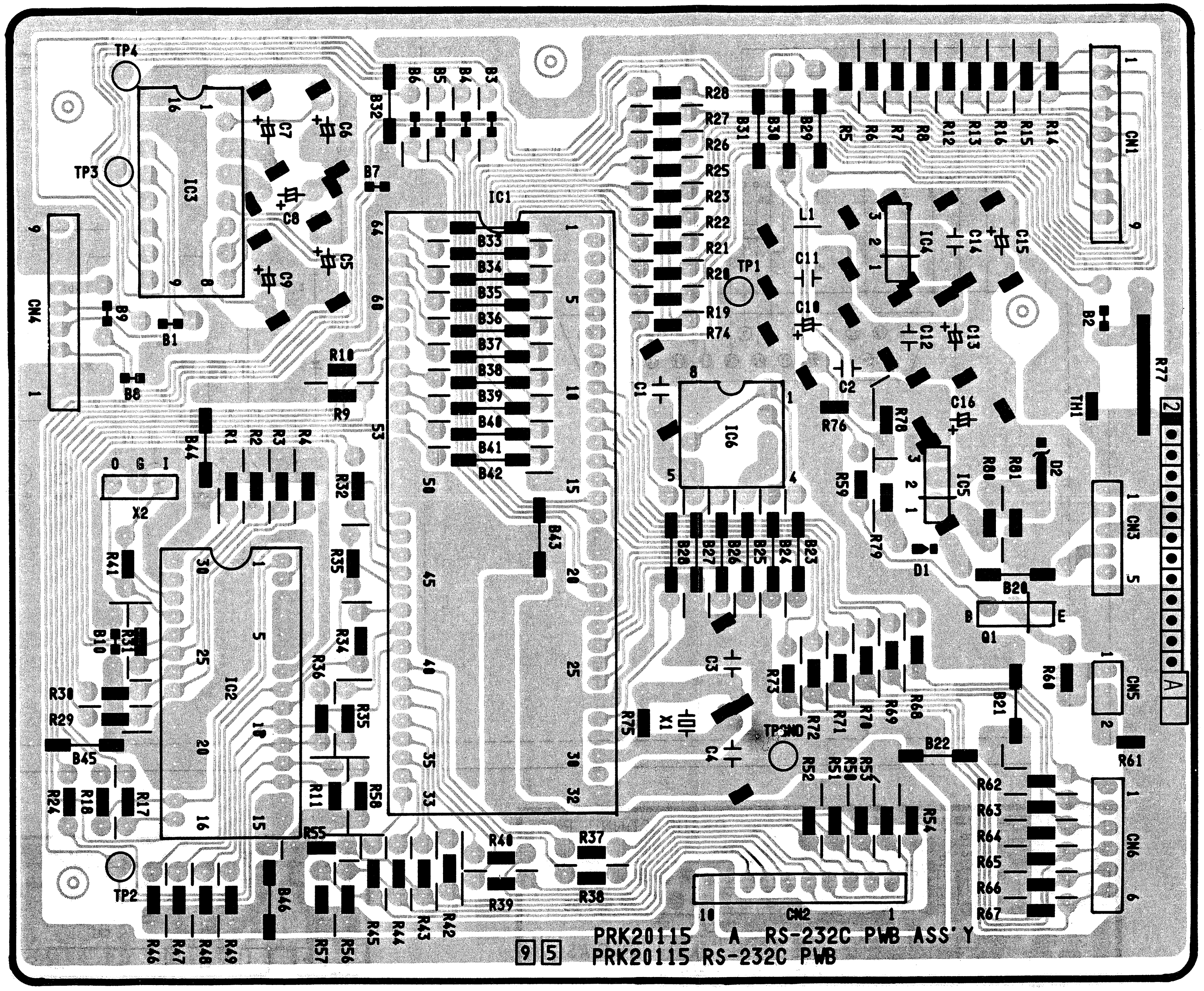
## 4.41 RS-232C CIRCUIT BOARD : SA-K90E

### — SR-232C Voltage —

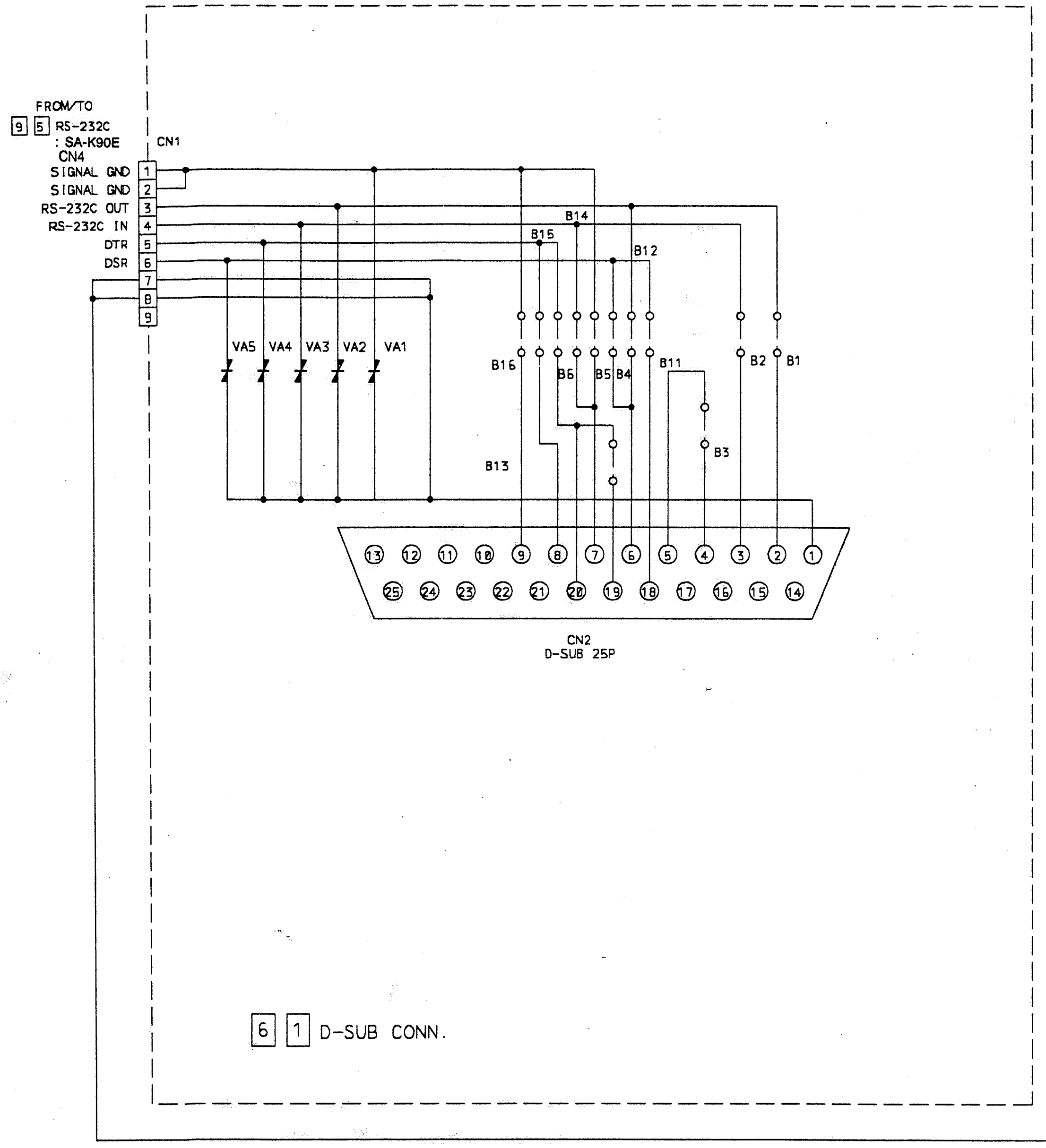
| Symbol No. | | REC | PB |
|---|---|---|---|
| **INTEGRATED CIRCUIT** | | | |
| IC1 | 1 | 5.0 | 5.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 0.0 | 0.0 |
| | 8 | 0.0 | 0.0 |
| | 9 | 0.0 | 0.0 |
| | 10 | 5.1 | 5.1 |
| | 11 | 0.0 | 0.0 |
| | 12 | 0.0 | 0.0 |
| | 13 | 0.0 | 0.0 |
| | 14 | 0.0 | 0.0 |
| | 15 | 0.0 | 0.0 |
| | 16 | 0.0 | 0.0 |
| | 17 | 0.0 | 0.0 |
| | 18 | 0.0 | 0.0 |
| | 19 | 0.0 | 0.0 |
| | 20 | 5.0 | 5.0 |
| | 21 | 5.0 | 5.0 |
| | 22 | 0.0 | 0.0 |
| | 23 | 0.0 | 0.0 |
| | 24 | 0.0 | 0.0 |
| | 25 | 0.0 | 0.0 |
| | 26 | 2.5 | 2.5 |
| | 27 | 0.0 | 0.0 |
| | 28 | 5.0 | 5.0 |
| | 29 | 2.2 | 2.2 |
| | 30 | 1.6 | 1.6 |
| | 31 | 2.4 | 2.4 |
| | 32 | 0.0 | 0.0 |
| | 33 | 5.0 | 5.0 |
| | 34 | 5.0 | 5.0 |
| | 35 | 5.0 | 5.0 |
| | 36 | 5.0 | 5.0 |
| | 37 | 2.6 | 2.6 |
| | 38 | 2.6 | 2.6 |
| | 39 | 2.6 | 2.6 |
| | 40 | 2.6 | 2.6 |
| | 41 | 5.0 | 5.0 |
| | 42 | 5.0 | 5.0 |
| | 43 | 5.0 | 5.0 |
| | 44 | 5.0 | 5.0 |
| | 45 | 5.0 | 5.0 |
| | 46 | 5.0 | 5.0 |
| | 47 | 5.0 | 5.0 |
| | 48 | 5.0 | 5.0 |
| | 49 | 0.0 | 0.0 |
| | 50 | 0.0 | 0.0 |
| | 51 | 0.0 | 0.0 |
| | 52 | 0.0 | 0.0 |
| | 53 | 1.0 | 1.0 |
| | 54 | 1.8 | 1.8 |
| | 55 | 2.0 | 2.0 |
| | 56 | 2.5 | 2.5 |
| | 57 | 0.0 | 0.0 |
| | 58 | 0.0 | 0.0 |
| | 59 | 0.0 | 0.0 |
| | 60 | 2.5 | 2.5 |
| | 61 | 0.4 | 0.4 |
| | 62 | 1.3 | 1.3 |
| | 63 | 1.4 | 1.4 |
| | 64 | 1.5 | 1.5 |

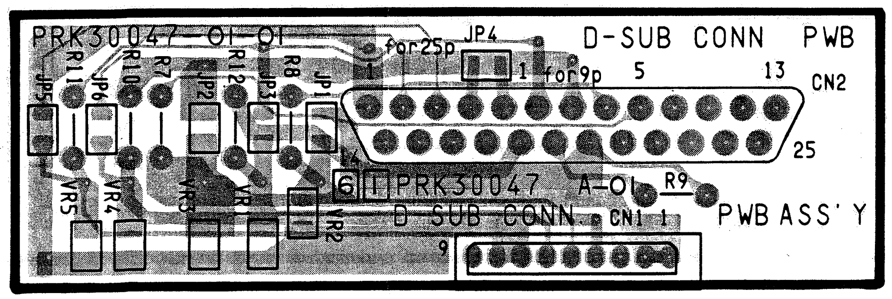
| Symbol No. | | REC | PB |
|---|---|---|---|
| IC2 | 1 | 5.0 | 5.0 |
| | 2 | 0.1 | 0.1 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 5.0 | 5.0 |
| | 8 | 5.0 | 5.0 |
| | 9 | 5.0 | 5.0 |
| | 10 | 5.0 | 5.0 |
| | 11 | 5.0 | 5.0 |
| | 12 | 0.1 | 0.1 |
| | 13 | 0.1 | 0.1 |
| | 14 | 0.0 | 0.0 |
| | 15 | 0.0 | 0.0 |
| | 16 | 0.1 | 0.1 |
| | 17 | 0.1 | 0.1 |
| | 18 | 0.0 | 0.0 |
| | 19 | 0.0 | 0.0 |
| | 20 | 0.0 | 0.0 |
| | 21 | 0.0 | 0.0 |
| | 22 | 0.0 | 0.0 |
| | 23 | 5.0 | 5.0 |
| | 24 | 5.0 | 5.0 |
| | 25 | 5.0 | 5.0 |
| | 26 | 5.0 | 5.0 |
| | 27 | 2.6 | 2.6 |
| | 28 | 2.4 | 2.4 |
| | 29 | 0.0 | 0.0 |
| | 30 | 5.0 | 5.0 |
| IC3 | 1 | 7.1 | 7.1 |
| | 2 | 9.8 | 9.8 |
| | 3 | 2.2 | 2.2 |
| | 4 | 5.7 | 5.7 |
| | 5 | -4.0 | -4.0 |
| | 6 | -9.5 | -9.5 |
| | 7 | 9.3 | 9.3 |
| | 8 | 0.1 | 0.1 |
| | 9 | 5.0 | 5.0 |
| | 10 | 0.0 | 0.0 |
| | 11 | 0.0 | 0.0 |
| | 12 | 5.0 | 5.0 |
| | 13 | 0.0 | 0.0 |
| | 14 | 9.3 | 9.3 |
| | 15 | 0.0 | 0.0 |
| | 16 | 5.0 | 5.0 |
| IC4 | 1 | 5.1 | 5.1 |
| | 2 | 0.0 | 0.0 |
| | 3 | 12.4 | 12.4 |
| IC5 | 1 | 5.2 | 5.2 |
| | 2 | 0.0 | 0.0 |
| | 3 | 5.0 | 5.0 |
| IC6 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.0 | 0.0 |
| | 4 | 0.0 | 0.0 |
| | 5 | 0.0 | 0.0 |
| | 6 | 0.0 | 0.0 |
| | 7 | 5.0 | 5.0 |
| | 8 | 5.0 | 5.0 |

| Symbol No. | | REC | PB |
|---|---|---|---|
| **TRANSISTOR** | | | |
| Q1 | B | 0.1 | 0.1 |
| | C | 5.9 | 5.9 |
| | E | 0.0 | 0.0 |
| **CONNECTOR** | | | |
| CN1 | 1 | 1.5 | 1.5 |
| | 2 | 1.5 | 1.5 |
| | 3 | 1.6 | 1.6 |
| | 4 | 0.4 | 0.4 |
| | 5 | 2.5 | 2.5 |
| | 6 | 2.1 | 2.1 |
| | 7 | 2.4 | 2.4 |
| | 8 | 1.9 | 1.9 |
| | 9 | 1.0 | 1.0 |
| CN2 | 1 | 5.1 | 5.1 |
| | 2 | 5.1 | 5.1 |
| | 3 | 5.1 | 5.1 |
| | 4 | 5.1 | 5.1 |
| | 5 | 5.0 | 5.0 |
| | 6 | 5.0 | 5.0 |
| | 7 | 5.0 | 5.0 |
| | 8 | 5.0 | 5.0 |
| | 9 | 5.0 | 5.0 |
| | 10 | 0.0 | 0.0 |
| CN3 | 1 | 12.6 | 12.6 |
| | 2 | 0.0 | 0.0 |
| | 3 | 0.1 | 0.1 |
| | 4 | 0.1 | 0.1 |
| | 5 | 0.1 | 0.1 |
| CN4 | 1 | 0.0 | 0.0 |
| | 2 | 0.0 | 0.0 |
| | 3 | -9.5 | -9.5 |
| | 4 | 0.0 | 0.0 |
| | 5 | 9.2 | 9.2 |
| | 6 | 0.1 | 0.1 |
| | 7 | -0.1 | -0.1 |
| | 8 | -0.2 | -0.2 |
| | 9 | -0.1 | -0.1 |
| CN5 | 1 | 5.9 | 5.9 |
| | 2 | 0.1 | 0.1 |
| CN6 | 1 | 5.1 | 5.1 |
| | 2 | 0.1 | 0.1 |
| | 3 | 0.1 | 0.1 |
| | 4 | 0.1 | 0.1 |
| | 5 | 0.1 | 0.1 |
| | 6 | 0.1 | 0.1 |

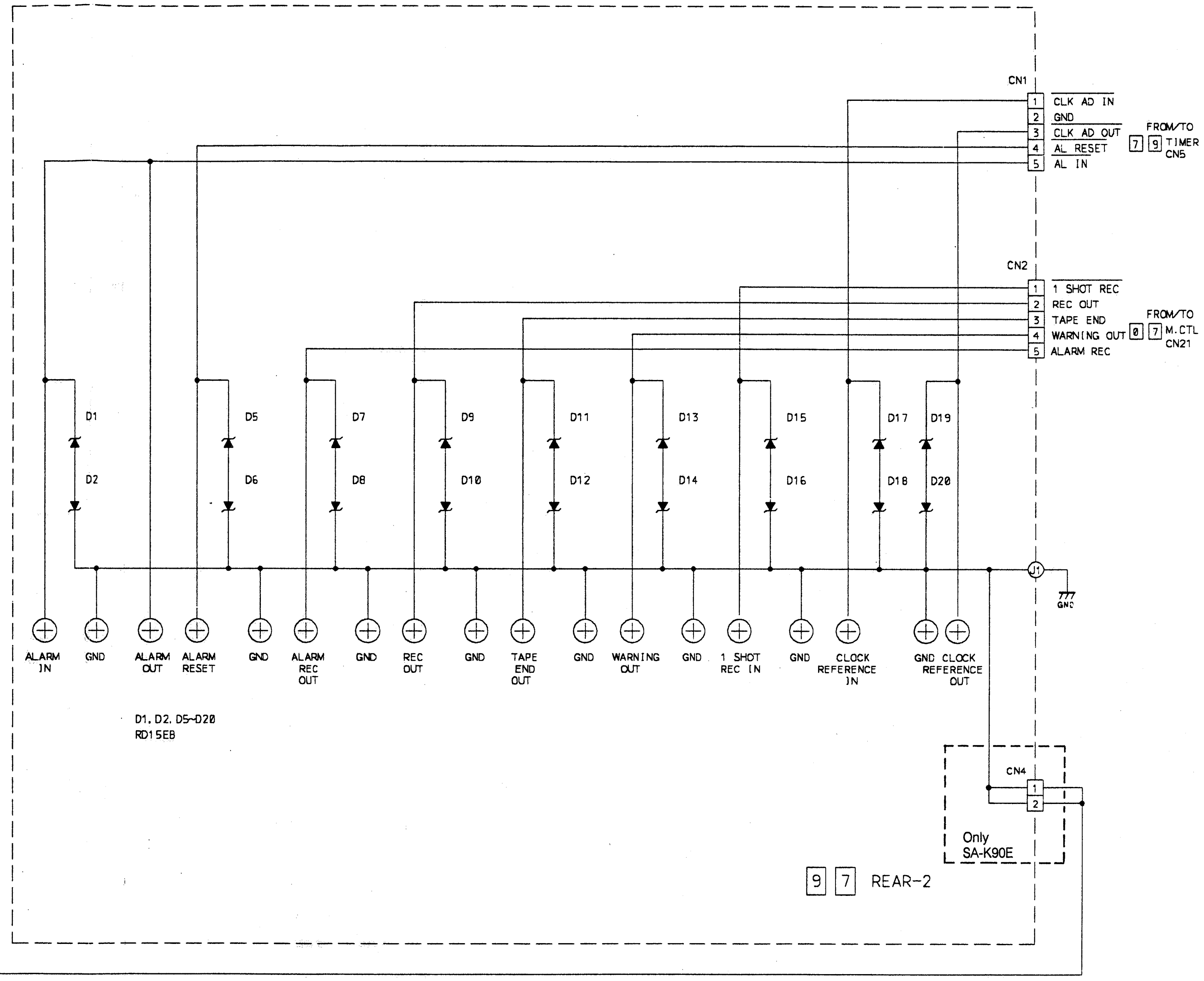


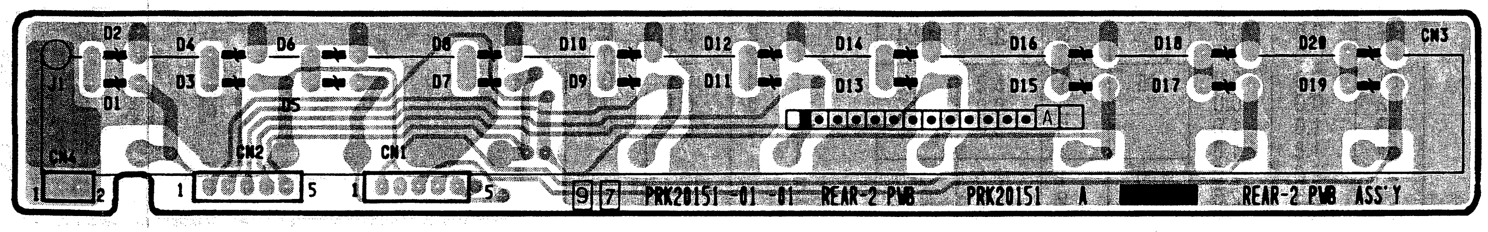
## 4.42 D-SUB CONNECTOR SCHEMATIC DIAGRAM & CIRCUIT BOARD : SA-K90E


FROM/TO
9 5 RS-232C
: SA-K90E
CN4
SIGNAL GND 1
SIGNAL GND 2
RS-232C OUT 3
RS-232C IN 4
DTR 5
DSR 6
7
8
9
CN1
VA5 VA4 VA3 VA2 VA1
B14
B15
B12
B16
B6 B5 B4
B11
B2 B1
B3
B13
13 12 11 10 9 8 7 6 5 4 3 2 1
25 24 23 22 21 20 19 18 17 16 15 14
CN2
D-SUB 25P
6 1 D-SUB CONN.


PRK30047-01-01
D-SUB CONN PWB
JP4
for25p
1 for9p
5
13
CN2
25
14
R11 JP6 R10 R7 JP2 R12 JP3 R8 JP1
JP5
VR5 VR4 VR3 VR1 VR2
6 1 PRK30047 A-01
R9
D-SUB CONN
CN1 1
PWB ASS'Y
9

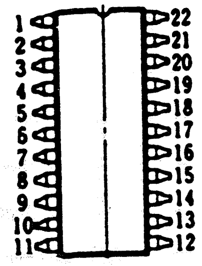
## 4.43 REAR-2 SCHEMATIC DIAGRAM & CIRCUIT BOARD : BR-9020E & SA-K90E


CN1
1 CLK AD IN
2 GND
3 CLK AD OUT
4 AL RESET
5 AL IN
FROM/TO
7 9 TIMER
CN5
CN2
1 1 SHOT REC
2 REC OUT
3 TAPE END
4 WARNING OUT
5 ALARM REC
FROM/TO
8 7 M.CTL
CN21
D1 D2 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18 D19 D20
J1
GND
ALARM IN
GND
ALARM OUT
ALARM RESET
GND
ALARM REC OUT
GND
REC OUT
GND
TAPE END OUT
GND
WARNING OUT
GND
1 SHOT REC IN
GND
CLOCK REFERENCE IN
GND
CLOCK REFERENCE OUT
D1, D2, D5~D20
RD15EB
CN4
1
2
Only
SA-K90E
9 7 REAR-2

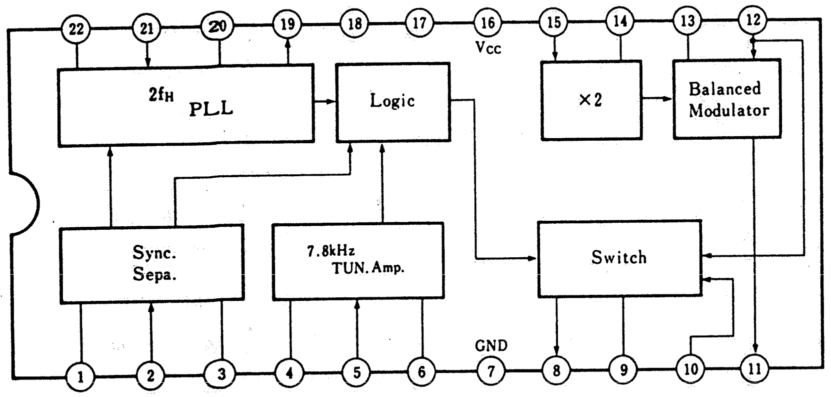

D2 D4 D6 D8 D10 D12 D14 D16 D18 D20 CN3
J1 D1 D3 D5 D7 D9 D11 D13 D15 D17 D19
A
CN4 1 2
CN2 1 5
CN1 1 5
9 7 PRK20151-01-01 REAR-2 PWB PRK20151 A REAR-2 PWB ASS'Y

## 4.44 IC BLOCK DIAGRAM

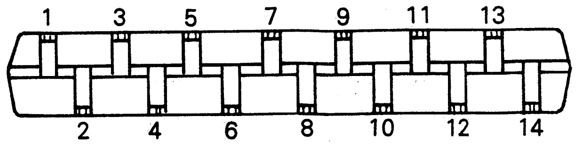
### ■ AN3592K 【Panasonic】
(PAL VTR Jumping Correction Circuits)

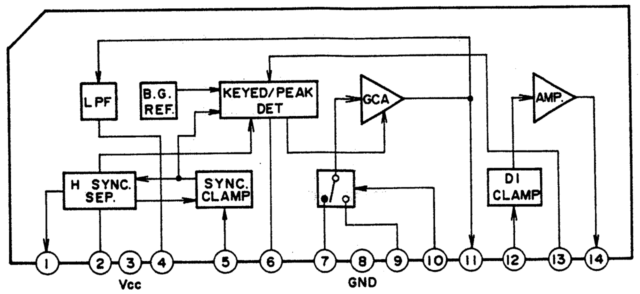

1
2
3
4
5
6
7
8
9
10
11
22
21
20
19
18
17
16
15
14
13
12

(TOP VIEW)

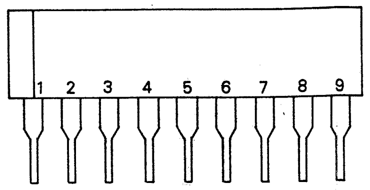

22
21
20
19
18
17
16
Vcc
15
14
13
12
2fH PLL
Logic
×2
Balanced Modulator
Sync. Sepa.
7.8kHz TUN. Amp.
Switch
GND
1
2
3
4
5
6
7
8
9
10
11

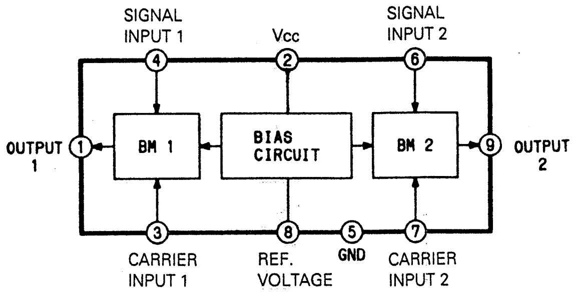
### ■ AN3916 【MATSUSHITA】
(Video AGC)


1
3
5
7
9
11
13
2
4
6
8
10
12
14

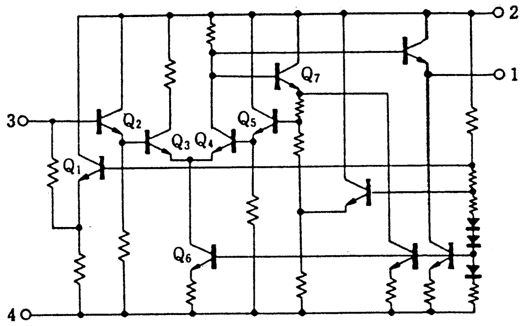

LPF
B.G. REF.
KEYED/PEAK DET
GCA
AMP.
H SYNC. SEP.
SYNC. CLAMP
DI CLAMP
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Vcc
GND

### ■ AN6041 【MATSUSHITA】
(Dual Balanced Modulator)

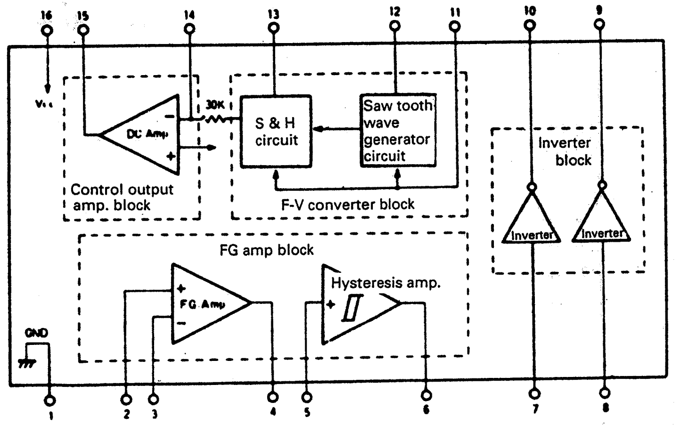



SIGNAL INPUT 1
Vcc
SIGNAL INPUT 2
4
2
6
OUTPUT 1
1
BM 1
BIAS CIRCUIT
BM 2
9
OUTPUT 2
3
8
5
7
CARRIER INPUT 1
REF. VOLTAGE
GND
CARRIER INPUT 2

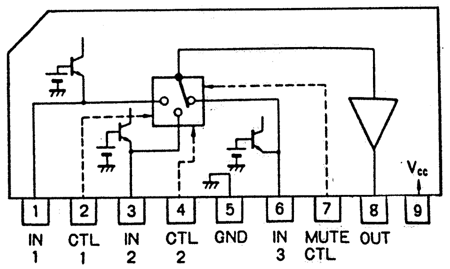
### ■ AN608P 【MATSUSHITA】
(Amp.)


2
1
3
4
Q1
Q2
Q3
Q4
Q5
Q6
Q7

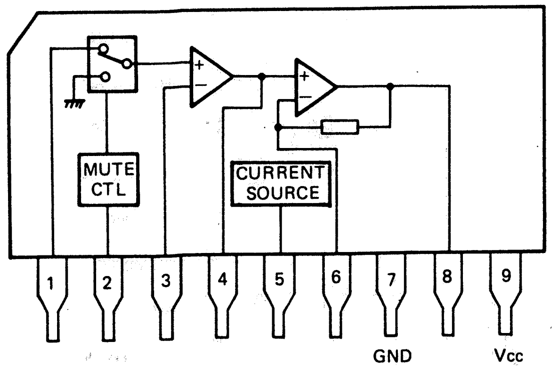
### ■ BA6302AF 【ROHM】
(IC for FG System Speed Servo Control)


16
15
14
13
12
11
10
9
Vcc
DC Amp
30K
S & H circuit
Saw tooth wave generator circuit
Control output amp. block
F-V converter block
Inverter block
Inverter
Inverter
FG amp block
FG Amp
Hysteresis amp.
GND
1
2
3
4
5
6
7
8

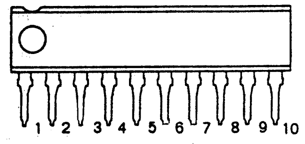
### ■ BA7021 【ROHM】
(Video Signal Switcher)

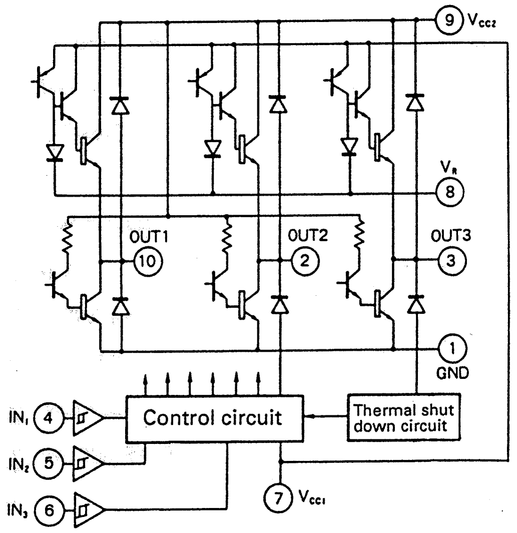

Vcc
1
2
3
4
5
6
7
8
9
IN 1
CTL 1
IN 2
CTL 2
GND
IN 3
MUTE CTL
OUT

### ■ AN6392 【Panasonic】
(VTR REC Amplifier)

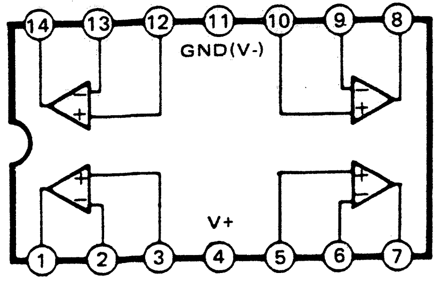

MUTE CTL
CURRENT SOURCE
1
2
3
4
5
6
7
8
9
GND
Vcc

### ■ BA6259N 【ROHM】
(2-ch Reversible Motor Driver)

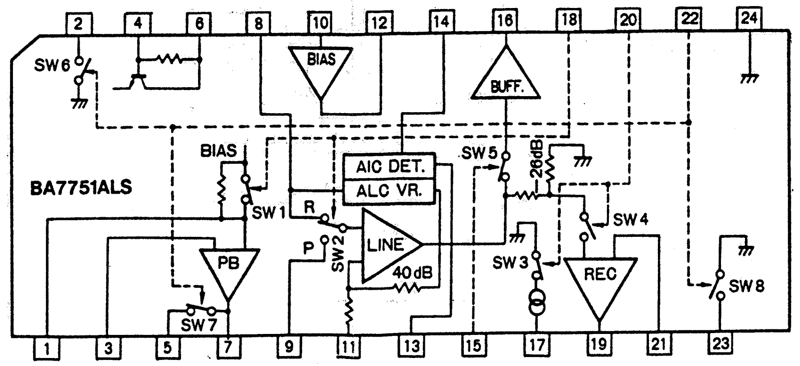

1
2
3
4
5
6
7
8
9
10


9 Vcc2
VR
8
OUT1
10
OUT2
2
OUT3
3
1
GND
IN1 4
IN2 5
IN3 6
Control circuit
Thermal shut down circuit
7 Vcc1

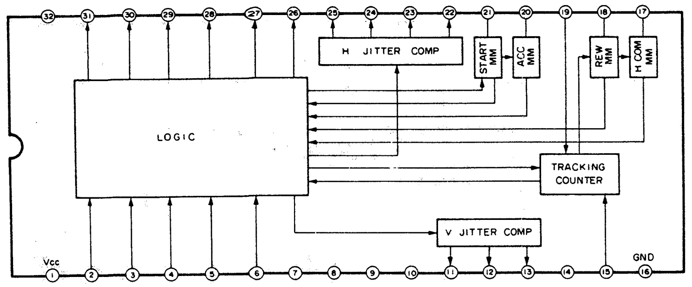
### ■ BA10324 【ROHM】
(Quad Ground Sense Operational Amplifiers)


14
13
12
11
10
9
8
GND(V-)
V+
1
2
3
4
5
6
7

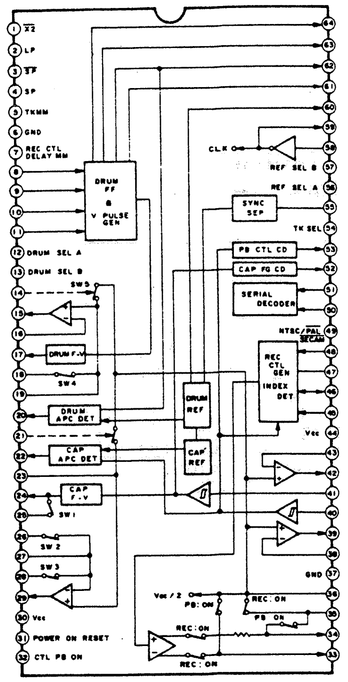
### ■ BA7751ALS 【ROHM】
(Normal Audio Signal Prosessings)


2
4
6
8
10
12
14
16
18
20
22
24
SW6
BIAS
BUFF.
BA7751ALS
BIAS
SW1
AIC DET.
ALC VR.
SW5
26dB
R
P
SW2
LINE
40dB
SW4
SW3
REC
PB
SW7
SW8
1
3
5
7
9
11
13
15
17
19
21
23

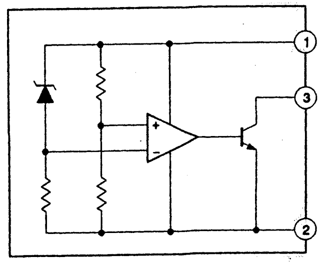
## ■ BU2767S 【ROHM】
(VTR Fine SLOW/STILL Circuit)


H JITTER COMP
START MM
ACC MM
REW MM
H COM MM
LOGIC
TRACKING COUNTER
V JITTER COMP
Vcc
GND

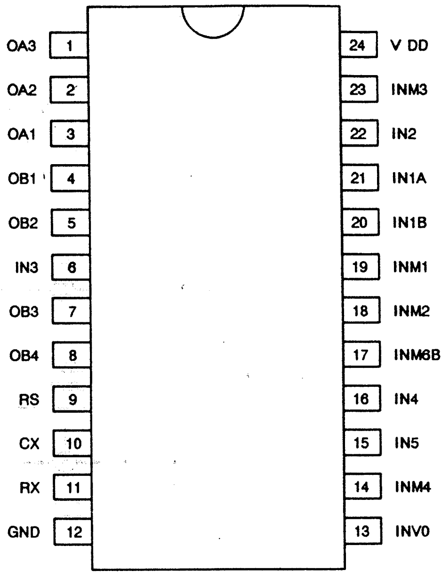
## ■ HD49722NT 【HITACHI】
(VTR Servo Switcher)


X2
LP
SP
SP
TKMM
GND
REC CTL DELAY MM
DRUM FF & V PULSE GEN
DRUM SEL A
DRUM SEL B
SW5
DRUM F-V
SW4
DRUM APC DET
CAP APC DET
CAP F-V
SW1
SW2
SW3
Vcc
POWER ON RESET
CTL PB ON
CLK
REF SEL B
REF SEL A
SYNC SEP
TK SEL
PB CTL CD
CAP FG CD
SERIAL DECODER
NTSC/PAL SECAM
REC CTL GEN INDEX DET
DRUM REF
CAP REF
Vcc
GND
Vcc / 2
PB : ON
REC : ON
PB ON
REC : ON
REC : ON

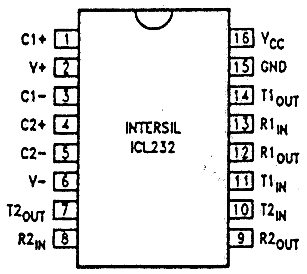
## ■ IC-PST523H-2 【MITSUMI】
(System Reset)

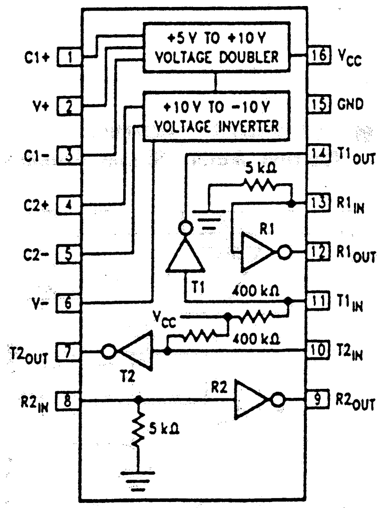


## ■ BU3791 【ROHM】
(Head Switch Signal Generator)

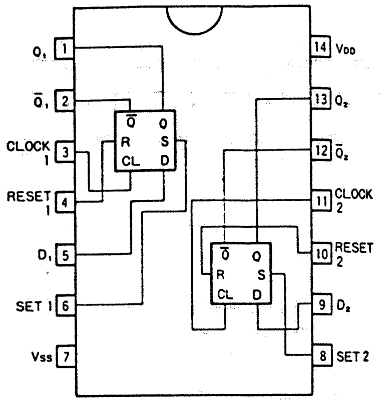

OA3 1
OA2 2
OA1 3
OB1 4
OB2 5
IN3 6
OB3 7
OB4 8
RS 9
CX 10
RX 11
GND 12
24 V DD
23 INM3
22 IN2
21 IN1A
20 IN1B
19 INM1
18 INM2
17 INM6B
16 IN4
15 IN5
14 INM4
13 INVO

## ■ ICL232CPE 【INTERSIL】
(+5V Powered Dual RS-232 Transmitter/Receiver)


C1+ 1
V+ 2
C1- 3
C2+ 4
C2- 5
V- 6
T2OUT 7
R2IN 8
INTERSIL ICL232
16 Vcc
15 GND
14 T1OUT
13 R1IN
12 R1OUT
11 T1IN
10 T2IN
9 R2OUT

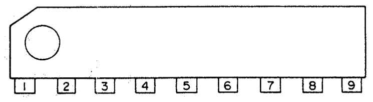

C1+ 1
V+ 2
C1- 3
C2+ 4
C2- 5
V- 6
T2OUT 7
R2IN 8
+5V TO +10V VOLTAGE DOUBLER
+10V TO -10V VOLTAGE INVERTER
5kΩ
R1
T1
400kΩ
VCC
400kΩ
T2
R2
5kΩ
16 Vcc
15 GND
14 T1OUT
13 R1IN
12 R1OUT
11 T1IN
10 T2IN
9 R2OUT

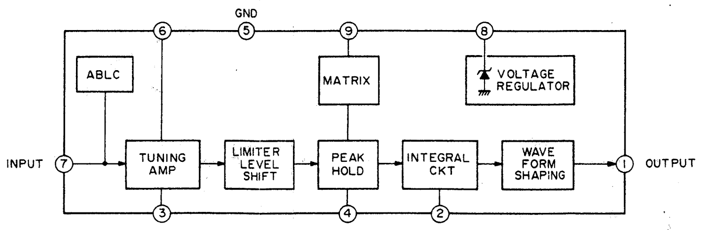
## ■ BU4013B 【ROHM】
(Dual D-Type Flip-Flop)


Q1 1
Q̄1 2
CLOCK 1 3
RESET 1 4
D1 5
SET 1 6
Vss 7
14 VDD
13 Q2
12 Q̄2
11 CLOCK 2
10 RESET 2
9 D2
8 SET 2
Q̄ Q
R S
CL D

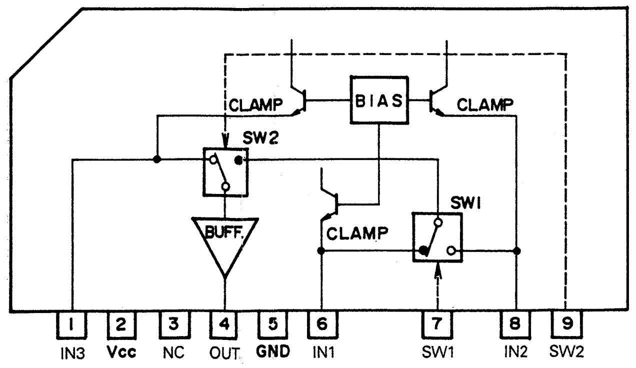
(TOP VIEW)

## ■ LA7225 【SANYO】
(PRE-Amplifier Circuit for Remocon Signal Receivers)

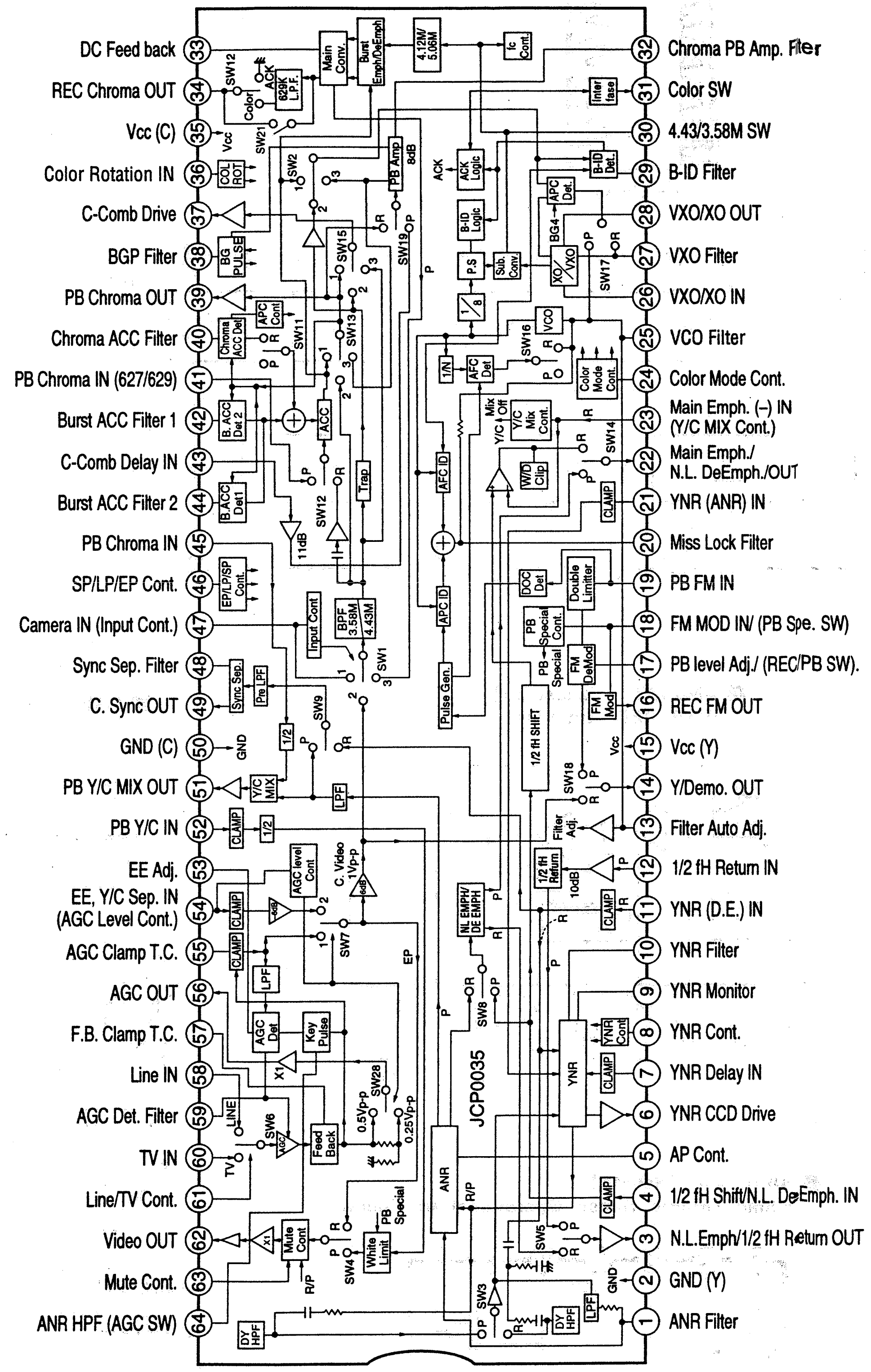



GND
6
5
9
8
ABLC
MATRIX
VOLTAGE REGULATOR
INPUT 7
TUNING AMP
LIMITER LEVEL SHIFT
PEAK HOLD
INTEGRAL CKT
WAVE FORM SHAPING
1 OUTPUT
3
4
2

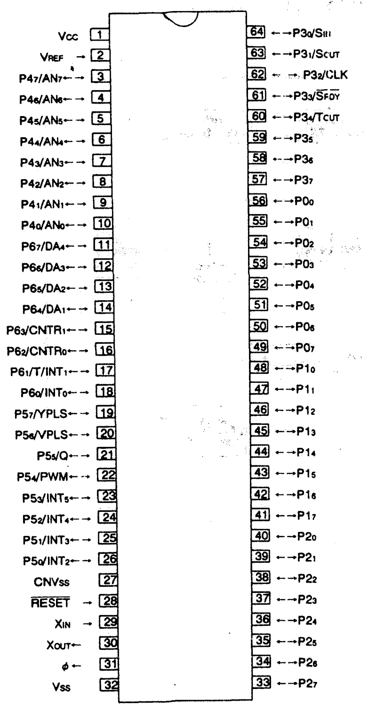
## ■ LVA523SA 【MITSUMI】
(Switch)


CLAMP
BIAS
CLAMP
SW2
SW1
BUFF.
CLAMP
1 IN3
2 Vcc
3 NC
4 OUT
5 GND
6 IN1
7 SW1
8 IN2
9 SW2

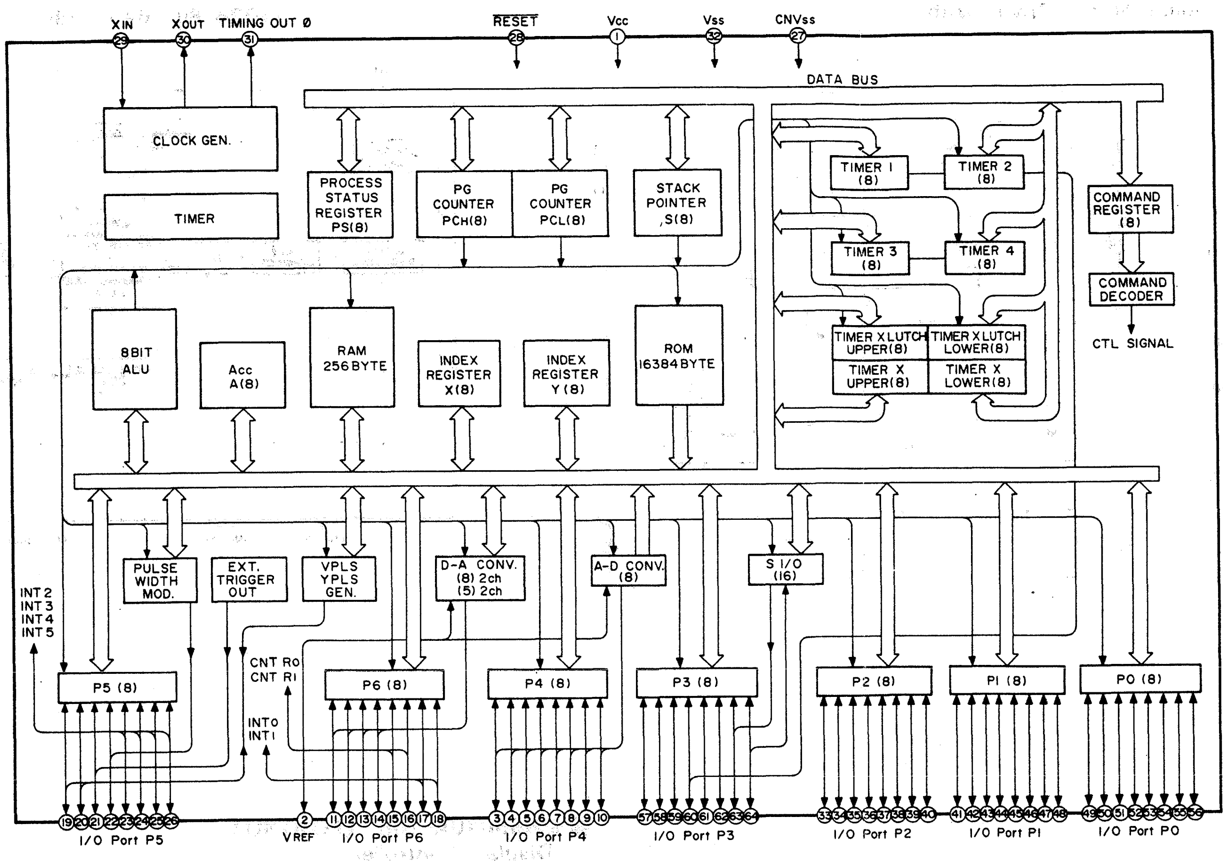
## ■ JCP0035-2 【JVC】
(VHS Y/C Processor for VTR)


DC Feed back 33
REC Chroma OUT 34
Vcc (C) 35
Color Rotation IN 36
C-Comb Drive 37
BGP Filter 38
PB Chroma OUT 39
Chroma ACC Filter 40
PB Chroma IN (627/629) 41
Burst ACC Filter 1 42
C-Comb Delay IN 43
Burst ACC Filter 2 44
PB Chroma IN 45
SP/LP/EP Cont. 46
Camera IN (Input Cont.) 47
Sync Sep. Filter 48
C. Sync OUT 49
GND (C) 50
PB Y/C MIX OUT 51
PB Y/C IN 52
EE Adj. 53
EE, Y/C Sep. IN (AGC Level Cont.) 54
AGC Clamp T.C. 55
AGC OUT 56
F.B. Clamp T.C. 57
Line IN 58
AGC Det. Filter 59
TV IN 60
Line/TV Cont. 61
Video OUT 62
Mute Cont. 63
ANR HPF (AGC SW) 64
32 Chroma PB Amp. Filter
31 Color SW
30 4.43/3.58M SW
29 B-ID Filter
28 VXO/XO OUT
27 VXO Filter
26 VXO/XO IN
25 VCO Filter
24 Color Mode Cont.
23 Main Emph. (-) IN (Y/C MIX Cont.)
22 Main Emph./ N.L. DeEmph./OUT
21 YNR (ANR) IN
20 Miss Lock Filter
19 PB FM IN
18 FM MOD IN/ (PB Spe. SW)
17 PB level Adj./ (REC/PB SW).
16 REC FM OUT
15 Vcc (Y)
14 Y/Demo. OUT
13 Filter Auto Adj.
12 1/2 fH Return IN
11 YNR (D.E.) IN
10 YNR Filter
9 YNR Monitor
8 YNR Cont.
7 YNR Delay IN
6 YNR CCD Drive
5 AP Cont.
4 1/2 fH Shift/N.L. DeEmph. IN
3 N.L.Emph/1/2 fH Return OUT
2 GND (Y)
1 ANR Filter
Main Conv.
Burst Emph/DeEmph
4.12M/5.06M
Ic Cont.
Inter lace
SW12
Color
ACK
SW21
629K L.P.F.
COL ROT
PB Amp 8dB
ACK Logic
APC Det
B-ID Det
BG PULSE
B-ID Logic
P.S
Sub Conv
XO VXO
BG4
SW17
APC Cont
SW15
SW19
SW13
SW11
Chroma ACC Det
1/8
VCO
SW16
Color Mode Cont.
B.ACC Det 2
ACC
I/N
AFC Det
Mix Off
Y/C Mix Cont
SW14
B.ACC Det 1
Trap
W/D Clip
CLAMP
11dB
AFC ID
EP/LP/SP Cont.
Input Cont.
BPF 3.58M 4.43M
SW1
APC ID
DOC Det
Double Limiter
PB Special Cont.
FM Demod
Sync Sep
Pre LPF
SW9
Pulse Gen.
1/2 fH SHIFT
FM Mod
Vcc
1/2
Y/C MIX
LPF
SW18
CLAMP
Filter Adj.
AGC level Cont.
C. Video 1Vp-p
1/2 fH Return
10dB
NL EMPH/ DE EMPH
SW7
EP
LPF
SW8
AGC Det
Key Pulse
YNR Cont
YNR
SW28
0.5Vp-p
0.25Vp-p
JCP0035
LINE
SW6
Feed Back
ANR
R/P
TV
PB Special
X1
Mute Cont.
White Limit
SW4
SW5
SW3
DY HPF
DY HPF
LPF
GND

## ■ M37524E4-252SP 【MITSUBISHI】
(8-Bit Microcomputer)

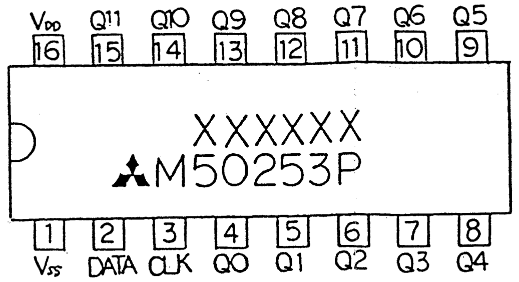


Vcc 1
$V_{REF}$ 2
$P4_7/AN_7$ 3
$P4_6/AN_6$ 4
$P4_5/AN_5$ 5
$P4_4/AN_4$ 6
$P4_3/AN_3$ 7
$P4_2/AN_2$ 8
$P4_1/AN_1$ 9
$P4_0/AN_0$ 10
$P6_7/DA_4$ 11
$P6_6/DA_3$ 12
$P6_5/DA_2$ 13
$P6_4/DA_1$ 14
$P6_3/CNTR_1$ 15
$P6_2/CNTR_0$ 16
$P6_1/T/INT_1$ 17
$P6_0/INT_0$ 18
$P5_7/YPLS$ 19
$P5_6/VPLS$ 20
$P5_5/Q$ 21
$P5_4/PWM$ 22
$P5_3/INT_5$ 23
$P5_2/INT_4$ 24
$P5_1/INT_3$ 25
$P5_0/INT_2$ 26
CNVss 27
RESET 28
$X_{IN}$ 29
$X_{OUT}$ 30
ϕ 31
Vss 32
64 $P3_0/S_{IN}$
63 $P3_1/S_{OUT}$
62 $P3_2/CLK$
61 $P3_3/\overline{S_{RDY}}$
60 $P3_4/T_{OUT}$
59 $P3_5$
58 $P3_6$
57 $P3_7$
56 $P0_0$
55 $P0_1$
54 $P0_2$
53 $P0_3$
52 $P0_4$
51 $P0_5$
50 $P0_6$
49 $P0_7$
48 $P1_0$
47 $P1_1$
46 $P1_2$
45 $P1_3$
44 $P1_4$
43 $P1_5$
42 $P1_6$
41 $P1_7$
40 $P2_0$
39 $P2_1$
38 $P2_2$
37 $P2_3$
36 $P2_4$
35 $P2_5$
34 $P2_6$
33 $P2_7$



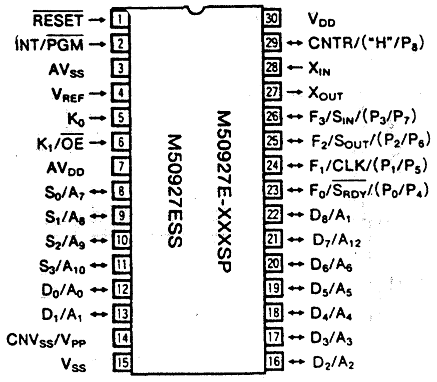
XIN
XOUT
TIMING OUT Ø
RESET
Vcc
Vss
CNVss
DATA BUS
CLOCK GEN.
TIMER
PROCESS STATUS REGISTER PS(8)
PG COUNTER PCH(8)
PG COUNTER PCL(8)
STACK POINTER S(8)
TIMER 1 (8)
TIMER 2 (8)
TIMER 3 (8)
TIMER 4 (8)
TIMER X LUTCH UPPER(8)
TIMER X LUTCH LOWER(8)
TIMER X UPPER(8)
TIMER X LOWER(8)
COMMAND REGISTER (8)
COMMAND DECODER
CTL SIGNAL
8BIT ALU
Acc A(8)
RAM 256BYTE
INDEX REGISTER X(8)
INDEX REGISTER Y(8)
ROM 16384BYTE
PULSE WIDTH MOD.
EXT. TRIGGER OUT
VPLS YPLS GEN.
D-A CONV. (8) 2ch (5) 2ch
A-D CONV. (8)
S I/O (16)
INT 2
INT 3
INT 4
INT 5
CNT R0
CNT R1
INT0
INT1
P5 (8)
P6 (8)
P4 (8)
P3 (8)
P2 (8)
PI (8)
P0 (8)
I/O Port P5
VREF
I/O Port P6
I/O Port P4
I/O Port P3
I/O Port P2
I/O Port PI
I/O Port P0

## ■ M50253P 【MITSUBISHI】
(Serial/Parallel Converter)



$V_{DD}$ 16
Q11 15
Q10 14
Q9 13
Q8 12
Q7 11
Q6 10
Q5 9
XXXXXX
M50253P
1 $V_{SS}$
2 DATA
3 CLK
4 Q0
5 Q1
6 Q2
7 Q3
8 Q4

## ■ M50927-258SP 【MITSUBISHI】
(4-Bit Microcomputer)

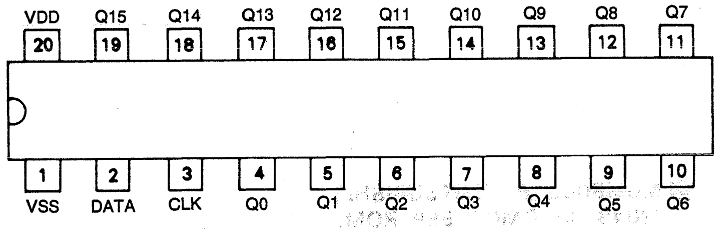


RESET 1
INT/PGM 2
$AV_{SS}$ 3
$V_{REF}$ 4
$K_0$ 5
$K_1/\overline{OE}$ 6
$AV_{DD}$ 7
$S_0/A_7$ 8
$S_1/A_8$ 9
$S_2/A_9$ 10
$S_3/A_{10}$ 11
$D_0/A_0$ 12
$D_1/A_1$ 13
$CNV_{SS}/V_{PP}$ 14
$V_{SS}$ 15
30 $V_{DD}$
29 CNTR/("H"/$P_8$)
28 $X_{IN}$
27 $X_{OUT}$
26 $F_3/S_{IN}/(P_3/P_7)$
25 $F_2/S_{OUT}/(P_2/P_6)$
24 $F_1/CLK/(P_1/P_5)$
23 $F_0/\overline{S_{RDY}}/(P_0/P_4)$
22 $D_8/A_1$
21 $D_7/A_{12}$
20 $D_6/A_6$
19 $D_5/A_5$
18 $D_4/A_4$
17 $D_3/A_3$
16 $D_2/A_2$
M50927ESS
M50927E-XXXSP

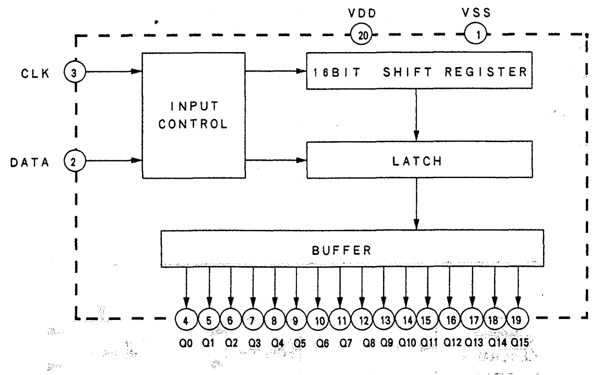
(TOP VIEW)

## ■ M50927E-258SP 【MITSUBISHI】
(See M50927-258SP.)

## ■ M50255P 【MITSUBISHI】
(16 Bit Serial/Parallel Converter)

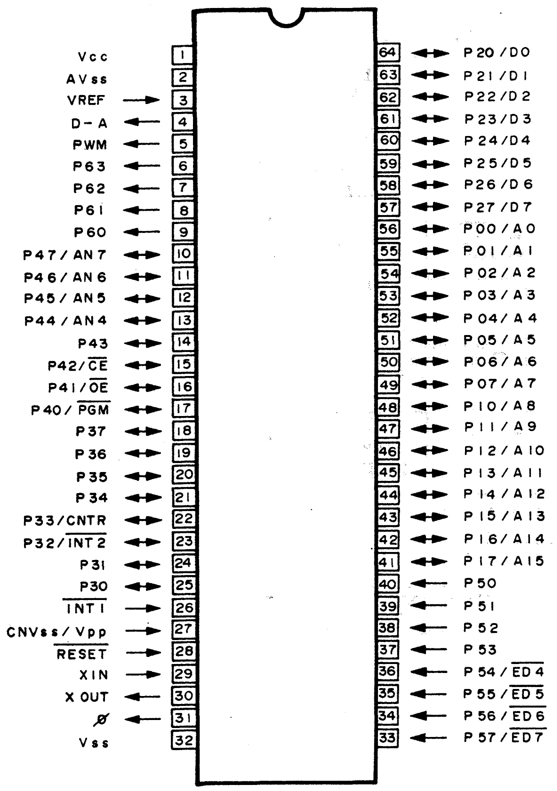


VDD 20
Q15 19
Q14 18
Q13 17
Q12 16
Q11 15
Q10 14
Q9 13
Q8 12
Q7 11
1 VSS
2 DATA
3 CLK
4 Q0
5 Q1
6 Q2
7 Q3
8 Q4
9 Q5
10 Q6



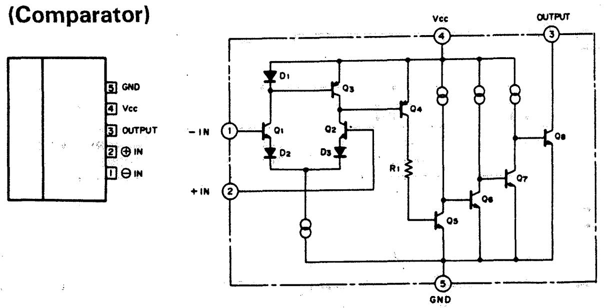
VDD 20
VSS 1
CLK 3
DATA 2
INPUT CONTROL
16BIT SHIFT REGISTER
LATCH
BUFFER
Q0 Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15

## ■ M50747E-2D1SP 【MITSUBISHI】
(Single-Chip 8-Bit CMOS Microcomputer)



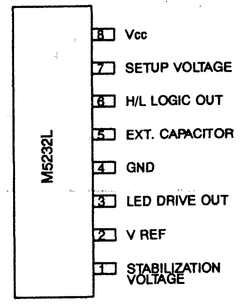
Vcc 1
AVss 2
VREF 3
D-A 4
PWM 5
P63 6
P62 7
P61 8
P60 9
P47/AN7 10
P46/AN6 11
P45/AN5 12
P44/AN4 13
P43 14
P42/$\overline{CE}$ 15
P41/$\overline{OE}$ 16
P40/$\overline{PGM}$ 17
P37 18
P36 19
P35 20
P34 21
P33/CNTR 22
P32/INT2 23
P31 24
P30 25
$\overline{INT1}$ 26
CNVss/Vpp 27
RESET 28
XIN 29
X OUT 30
Ø 31
Vss 32
64 P20/D0
63 P21/D1
62 P22/D2
61 P23/D3
60 P24/D4
59 P25/D5
58 P26/D6
57 P27/D7
56 P00/A0
55 P01/A1
54 P02/A2
53 P03/A3
52 P04/A4
51 P05/A5
50 P06/A6
49 P07/A7
48 P10/A8
47 P11/A9
46 P12/A10
45 P13/A11
44 P14/A12
43 P15/A13
42 P16/A14
41 P17/A15
40 P50
39 P51
38 P52
37 P53
36 P54/$\overline{ED4}$
35 P55/$\overline{ED5}$
34 P56/$\overline{ED6}$
33 P57/$\overline{ED7}$

## ■ M51204TL 【MITSUBISHI】
(Comparator)

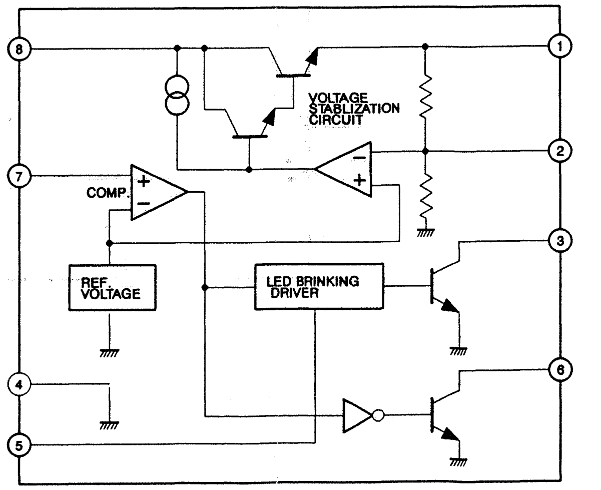


5 GND
4 Vcc
3 OUTPUT
2 ⊕IN
1 ⊖IN
Vcc
OUTPUT
-IN
+IN
D1
D2
D3
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
R1
GND

## ■ M5232L 【MITSUBISHI】
(Voltage Detect Circuit for Alarm System)

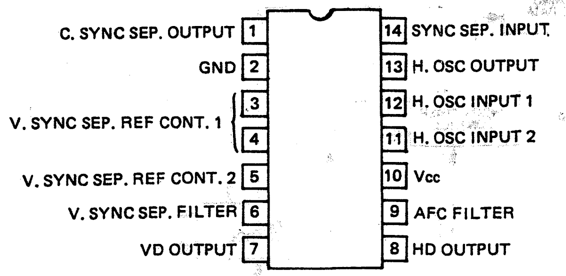


M5232L
8 Vcc
7 SETUP VOLTAGE
6 H/L LOGIC OUT
5 EXT. CAPACITOR
4 GND
3 LED DRIVE OUT
2 V REF
1 STABILIZATION VOLTAGE

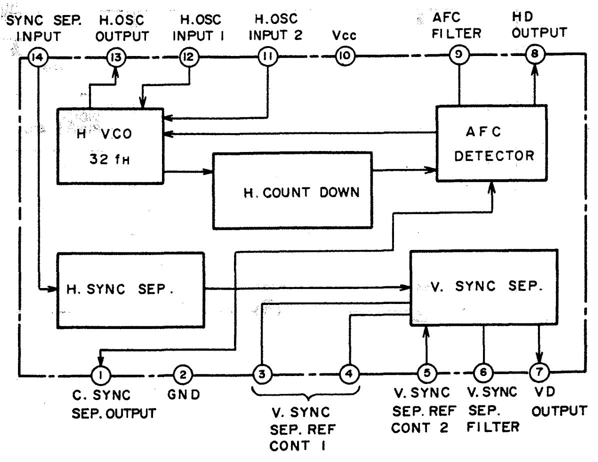


VOLTAGE STABLIZATION CIRCUIT
COMP.
REF. VOLTAGE
LED BRINKING DRIVER

## ■ M52684AP 【MITSUBISHI】
(SYNC Separator and AFC)



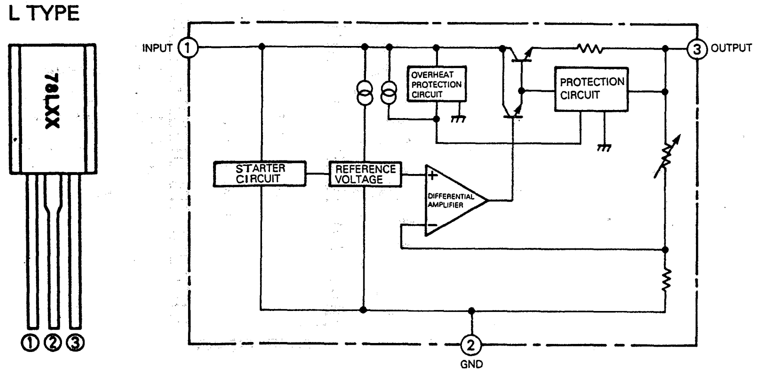
C. SYNC SEP. OUTPUT 1
GND 2
V. SYNC SEP. REF CONT. 1 3 4
V. SYNC SEP. REF CONT. 2 5
V. SYNC SEP. FILTER 6
VD OUTPUT 7
14 SYNC SEP. INPUT
13 H. OSC OUTPUT
12 H. OSC INPUT 1
11 H. OSC INPUT 2
10 Vcc
9 AFC FILTER
8 HD OUTPUT



SYNC SEP. INPUT
H.OSC OUTPUT
H.OSC INPUT 1
H.OSC INPUT 2
Vcc
AFC FILTER
HD OUTPUT
H VCO 32 fH
AFC DETECTOR
H. COUNT DOWN
H. SYNC SEP.
V. SYNC SEP.
C. SYNC SEP. OUTPUT
GND
V. SYNC SEP. REF CONT 1
V. SYNC SEP. REF CONT 2
V. SYNC SEP. FILTER
VD OUTPUT

## ■ M5278L09 【MITSUBISHI】
(3 Terminal Positive Voltage Regulator (+9V))

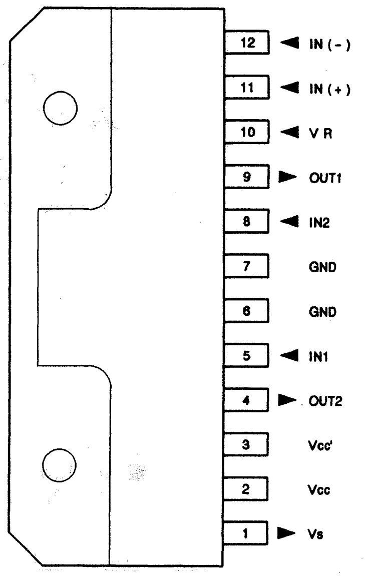
L TYPE



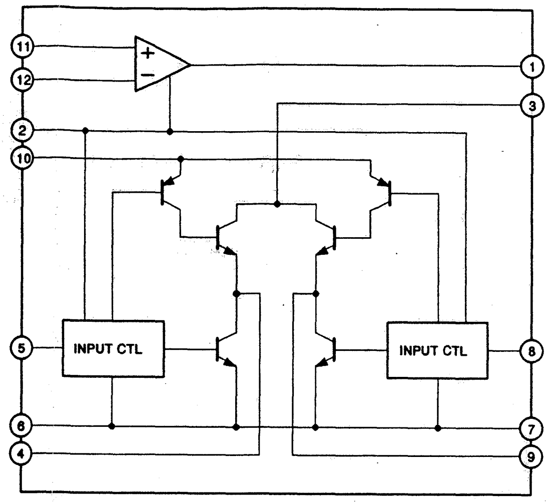
78LXX
①②③
INPUT ①
③ OUTPUT
OVERHEAT PROTECTION CIRCUIT
PROTECTION CIRCUIT
STARTER CIRCUIT
REFERENCE VOLTAGE
DIFFERENTIAL AMPLIFIER
②
GND

## ■ M5278L56 【MITSUBISHI】
(See M5278L09.)
(+5.6V)

## ■ M54647L 【MITSUBISHI】
(Bi-Directional Motor Driver with Op Amp)

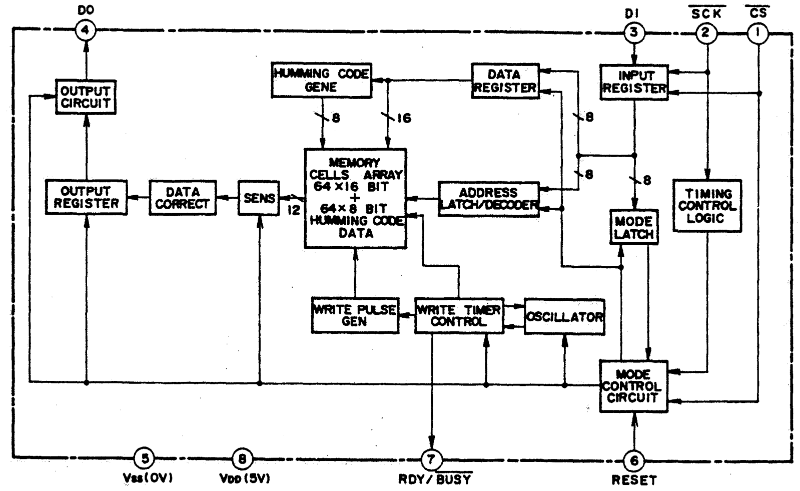


12 ◄ IN (−)
11 ◄ IN (+)
10 ◄ V R
9 ► OUT1
8 ◄ IN2
7 GND
6 GND
5 ◄ IN1
4 ► OUT2
3 Vcc'
2 Vcc
1 ► Vs



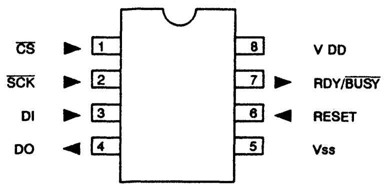
⑪
⑫
②
⑩
①
③
⑤
INPUT CTL
INPUT CTL
⑧
⑥
④
⑦
⑨

## ■ M6M80011AP 【MITSUBISHI】
(1024-Bit (64×16Bit) CMOS EEP ROM)

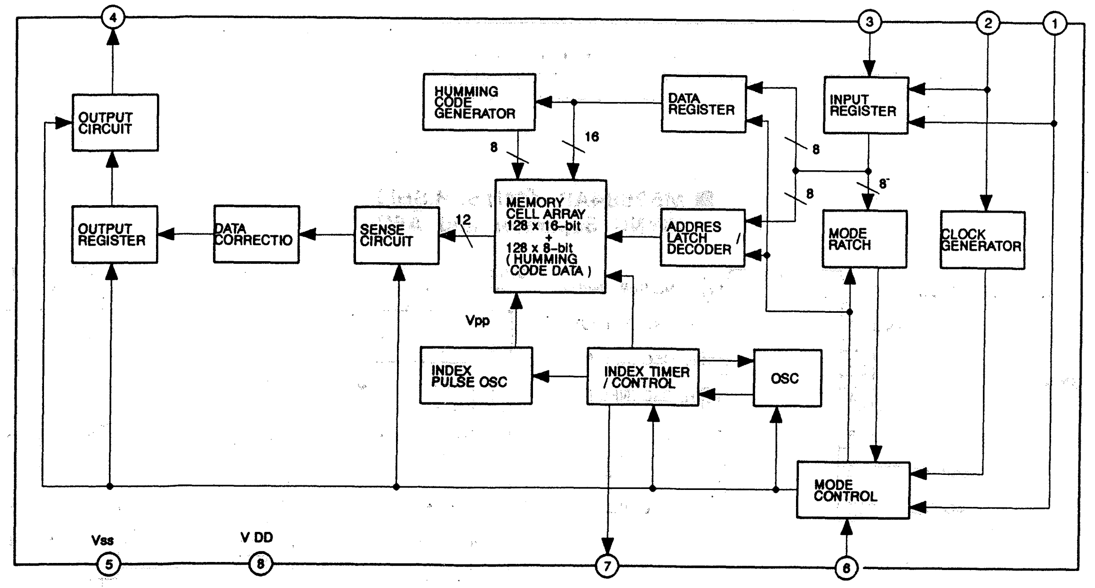


DO ④
DI ③
SCK ②
CS ①
OUTPUT CIRCUIT
HUMMING CODE GENE
DATA REGISTER
INPUT REGISTER
8
16
8
8
8
OUTPUT REGISTER
DATA CORRECT
SENS
12
MEMORY CELLS ARRAY 64×16 BIT + 64×8 BIT HUMMING CODE DATA
ADDRESS LATCH/DECODER
MODE LATCH
TIMING CONTROL LOGIC
WRITE PULSE GEN
WRITE TIMER CONTROL
OSCILLATOR
MODE CONTROL CIRCUIT
⑤ Vss(0V)
⑧ VDD(5V)
⑦ RDY/BUSY
⑥ RESET

## ■ M6M80021P 【MITSUBISHI】
(2048-Bit CMOS EEP ROM)

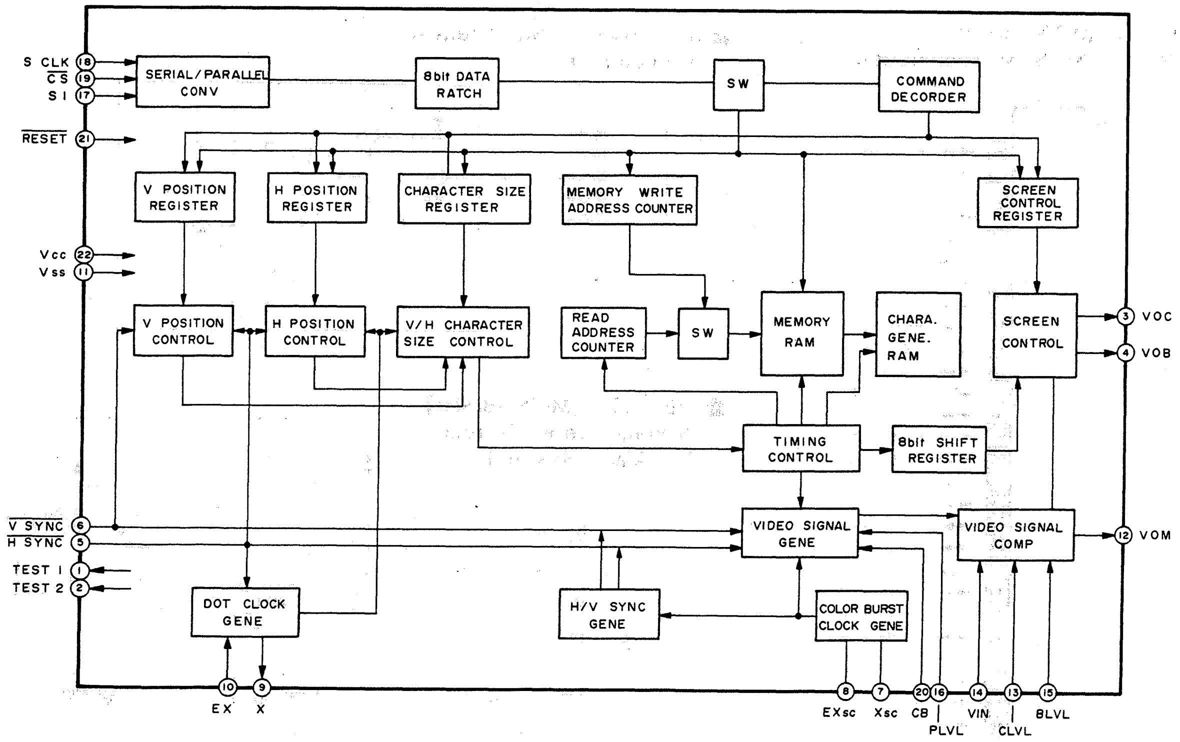


CS ► 1
SCK ► 2
DI ► 3
DO ◄ 4
8 V DD
7 ► RDY/BUSY
6 ◄ RESET
5 Vss



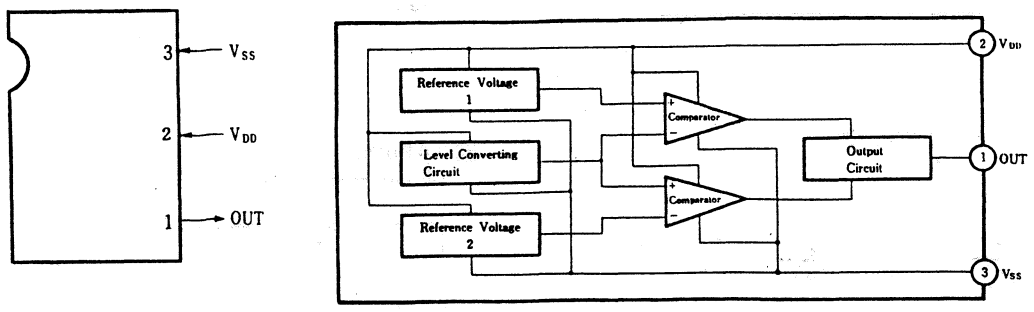
④
③
②
①
OUTPUT CIRCUIT
HUMMING CODE GENERATOR
DATA REGISTER
INPUT REGISTER
8
16
8
8
8
OUTPUT REGISTER
DATA CORRECTIO
SENSE CIRCUIT
12
MEMORY CELL ARRAY 128 x 16-bit + 128 x 8-bit ( HUMMING CODE DATA )
ADDRES LATCH / DECODER
MODE RATCH
CLOCK GENERATOR
Vpp
INDEX PULSE OSC
INDEX TIMER / CONTROL
OSC
MODE CONTROL
Vss ⑤
V DD ⑧
⑦
⑥

## ■ MB89010A-108 【FUJITSU】
(Display Controller)

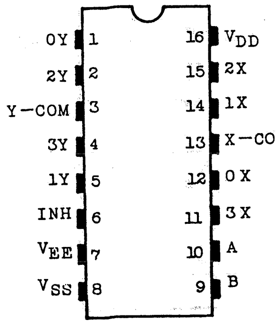


S CLK ⑱
CS ⑲
S I ⑰
RESET ㉑
Vcc ㉒
Vss ⑪
V SYNC ⑥
H SYNC ⑤
TEST 1 ①
TEST 2 ②
SERIAL/PARALLEL CONV
8bit DATA RATCH
SW
COMMAND DECORDER
V POSITION REGISTER
H POSITION REGISTER
CHARACTER SIZE REGISTER
MEMORY WRITE ADDRESS COUNTER
SCREEN CONTROL REGISTER
V POSITION CONTROL
H POSITION CONTROL
V/H CHARACTER SIZE CONTROL
READ ADDRESS COUNTER
SW
MEMORY RAM
CHARA. GENE. RAM
SCREEN CONTROL
③ VOC
④ VOB
TIMING CONTROL
8bit SHIFT REGISTER
VIDEO SIGNAL GENE
VIDEO SIGNAL COMP
⑫ VOM
DOT CLOCK GENE
H/V SYNC GENE
COLOR BURST CLOCK GENE
⑩ EX
⑨ X
⑧ EXsc
⑦ Xsc
⑳ CB
⑯ PLVL
⑭ VIN
⑬ CLVL
⑮ BLVL

## ■ MN1280P 【MATSUSHITA】
(Voltage Detecter)


3 VSS
2 VDD
1 OUT
Reference Voltage 1
Level Converting Circuit
Reference Voltage 2
Comparator
Comparator
Output Circuit
② VDD
① OUT
③ VSS

## ■ MN4052BS 【MATSUSHITA】
(Dual 4 Channel Analog Multiplexers/Demultiplexers)

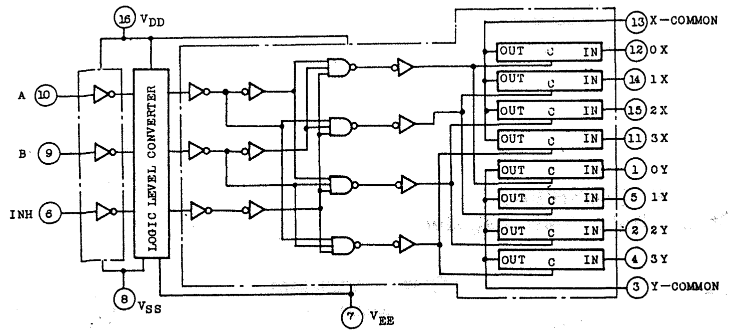

0Y 1
2Y 2
Y-COM 3
3Y 4
1Y 5
INH 6
VEE 7
VSS 8
16 VDD
15 2X
14 1X
13 X-COM
12 0X
11 3X
10 A
9 B

(TOP VIEW)

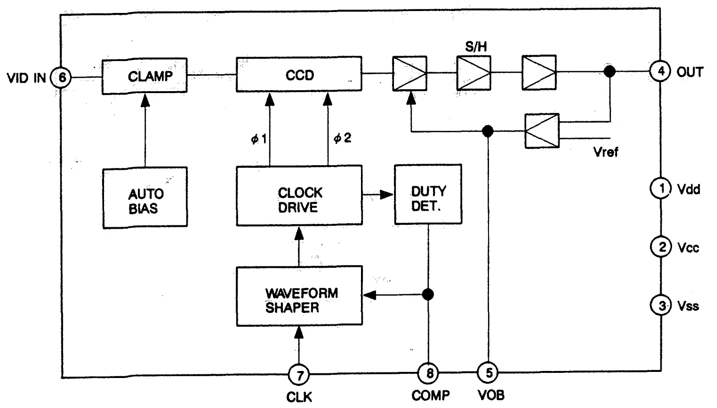
TRUTH TABLE

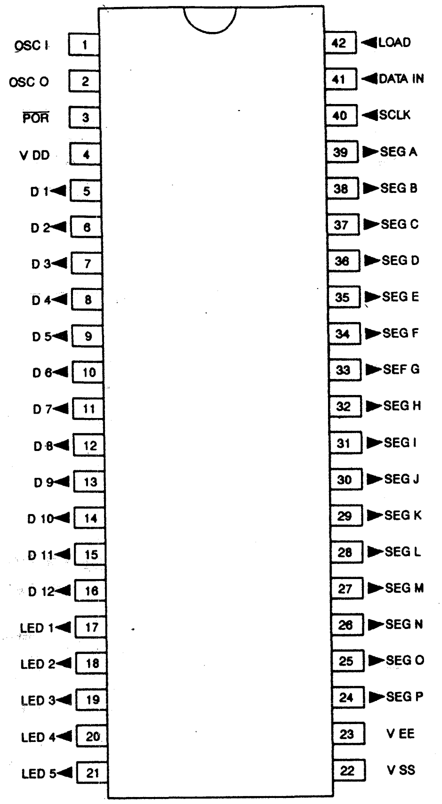
| CONTROL INPUTS | | | "ON" CHANNEL |
|---|---|---|---|
| INHIBIT | B | A | TC4052BP<br>TC4052BF |
| L | L | L | 0X、0Y |
| L | L | H | 1X、1Y |
| L | H | L | 2X、2Y |
| L | H | H | 3X、3Y |
| L | L | L | — |
| L | L | H | — |
| L | H | L | — |
| L | H | H | — |
| H | ※ | ※ | NONE |
| ※ Don't Care | | | |

LOGIC DIAGRAM


16 VDD
A 10
B 9
INH 6
LOGIC LEVEL CONVERTER
OUT C IN
13 X-COMMON
12 0X
14 1X
15 2X
11 3X
1 0Y
5 1Y
2 2Y
4 3Y
3 Y-COMMON
8 VSS
7 VEE

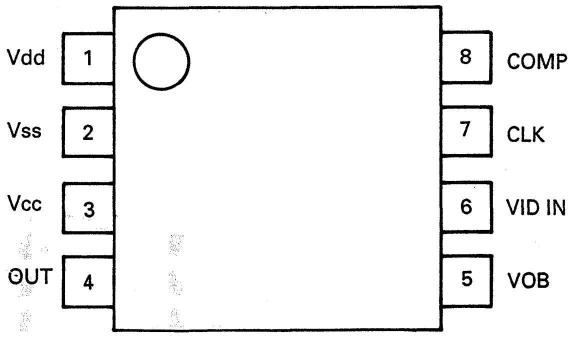
## ■ MSM6967RS 【OKI】
(CCD 1H Delayline)

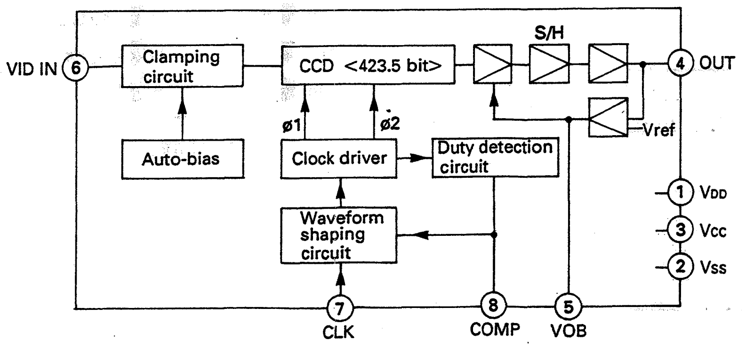

VID IN 6
CLAMP
CCD
S/H
4 OUT
φ1
φ2
Vref
AUTO BIAS
CLOCK DRIVE
DUTY DET.
1 Vdd
2 Vcc
3 Vss
WAVEFORM SHAPER
7 CLK
8 COMP
5 VOB


OSC I 1
OSC O 2
POR 3
V DD 4
D 1 5
D 2 6
D 3 7
D 4 8
D 5 9
D 6 10
D 7 11
D 8 12
D 9 13
D 10 14
D 11 15
D 12 16
LED 1 17
LED 2 18
LED 3 19
LED 4 20
LED 5 21
42 LOAD
41 DATA IN
40 SCLK
39 SEG A
38 SEG B
37 SEG C
36 SEG D
35 SEG E
34 SEG F
33 SEF G
32 SEG H
31 SEG I
30 SEG J
29 SEG K
28 SEG L
27 SEG M
26 SEG N
25 SEG O
24 SEG P
23 V EE
22 V SS

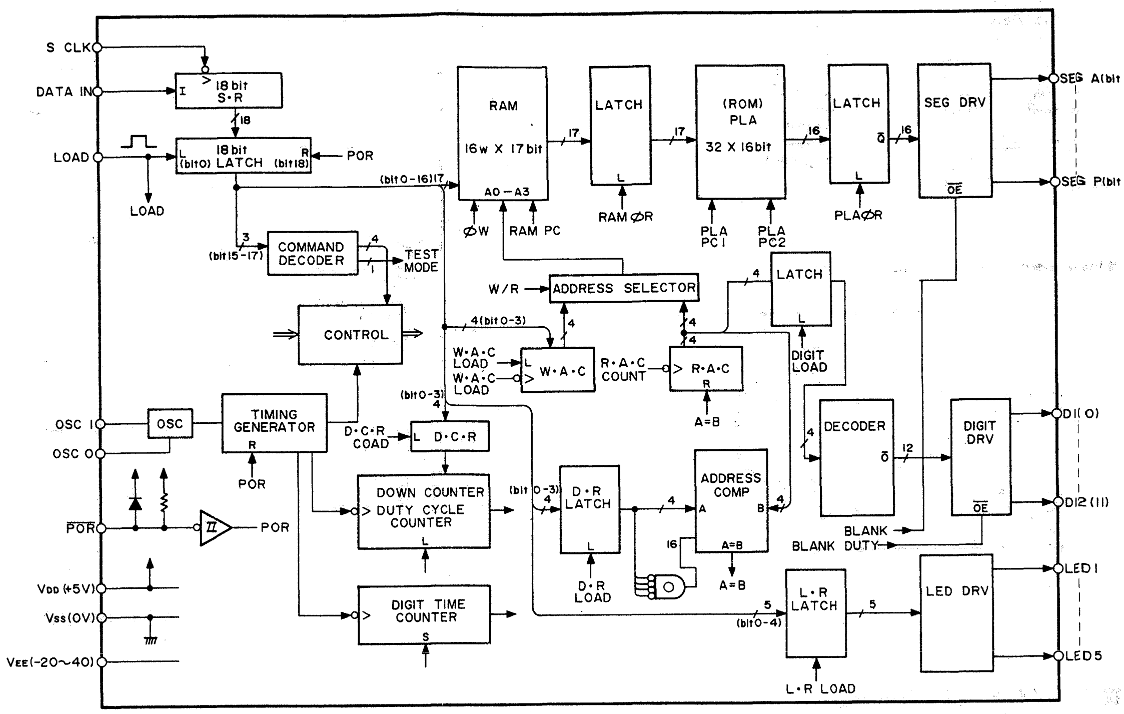
## ■ MSM6989RS 【OKI】
(CCD 0.5H Delayline)

(Top View)


Vdd 1
Vss 2
Vcc 3
OUT 4
8 COMP
7 CLK
6 VID IN
5 VOB

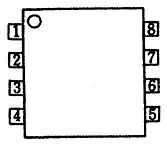

VID IN 6
Clamping circuit
CCD <423.5 bit>
S/H
4 OUT
ø1
ø2
Vref
Auto-bias
Clock driver
Duty detection circuit
Waveform shaping circuit
1 VDD
3 Vcc
2 Vss
7 CLK
8 COMP
5 VOB

## ■ MSC7112-01SS 【OKI】
(VF Display Controller)


S CLK
DATA IN
LOAD
18 bit S·R
18 bit LATCH
POR
RAM 16w X 17bit
LATCH
(ROM) PLA 32 X 16bit
LATCH
SEG DRV
SEG A(bit 0)
SEG P(bit 15)
A0 - A3
øW
RAM PC
RAM øR
PLA PC1
PLA PC2
PLAøR
COMMAND DECODER
TEST MODE
W/R
ADDRESS SELECTOR
LATCH
CONTROL
W·A·C LOAD
W·A·C
R·A·C COUNT
R·A·C
DIGIT LOAD
A=B
OSC I
OSC O
OSC
TIMING GENERATOR
D·C·R COAD
D·C·R
DOWN COUNTER DUTY CYCLE COUNTER
D·R LATCH
ADDRESS COMP
DECODER
DIGIT DRV
D1(0)
D12(11)
BLANK
BLANK DUTY
POR
DIGIT TIME COUNTER
D·R LOAD
L·R LATCH
LED DRV
LED1
LED5
L·R LOAD
VDD(+5V)
VSS(0V)
VEE(-20~-40)

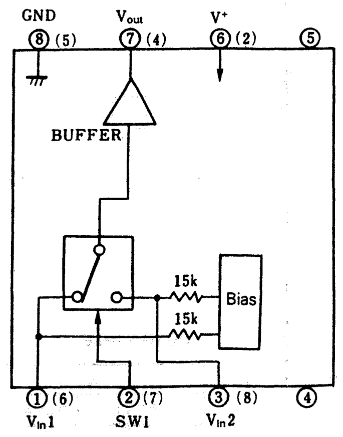
## ■ NJM2233BD 【JRC】
(2 Input Single Video Switch)

(Top View)



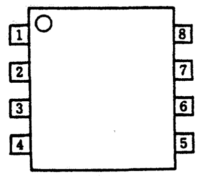
Pin Assignment

1. $V_{in}1$
2. SW1
3. $V_{in}2$
4. N.C.
5. N.C.
6. $V^+$
7. $V_{out}$
8. GND

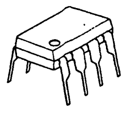

GND
8 (5)
Vout
7 (4)
V+
6 (2)
5
BUFFER
15k
15k
Bias
1 (6)
Vin1
2 (7)
SW1
3 (8)
Vin2
4

## ■ NJM2234D 【JRC】
(3 Input Single Video Switch)

(Top View)



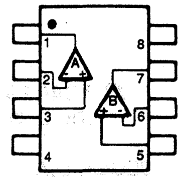
1. $V_{in}1$
2. SW1
3. $V_{in}2$
4. SW2
5. $V_{in}3$
6. $V^+$
7. $V_{out}$
8. GND



NJM2234D

## ■ NJM2903M 【JRC】
(Dual Single Supply Comparator)

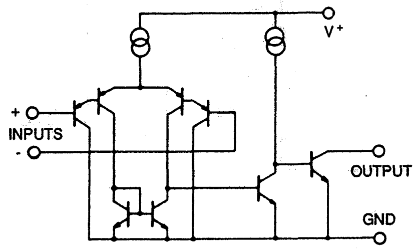
D, M Type
(Top View)


1
2
3
4
5
6
7
8
A
B

Pin Assignment

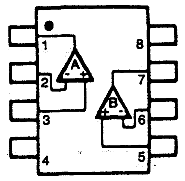
1. A OUTPUT
2. A−INPUT
3. A+INPUT
4. GND
5. B+INPUT
6. B−INPUT
7. B OUTPUT
8. V⁺

**■ Equivalent Circuit (2 circuits in a chip)**


V+
+
INPUTS
-
OUTPUT
GND

## ■ NJM2904M 【JRC】
(Dual Single Supply Op.Amp)

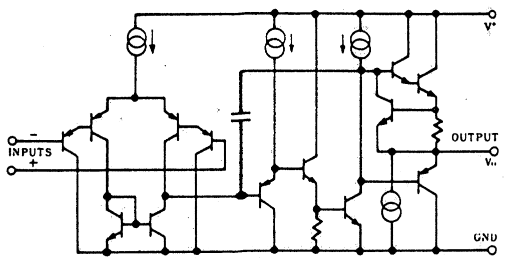
D, M Type
(Top View)


1
2
3
4
5
6
7
8
A
B

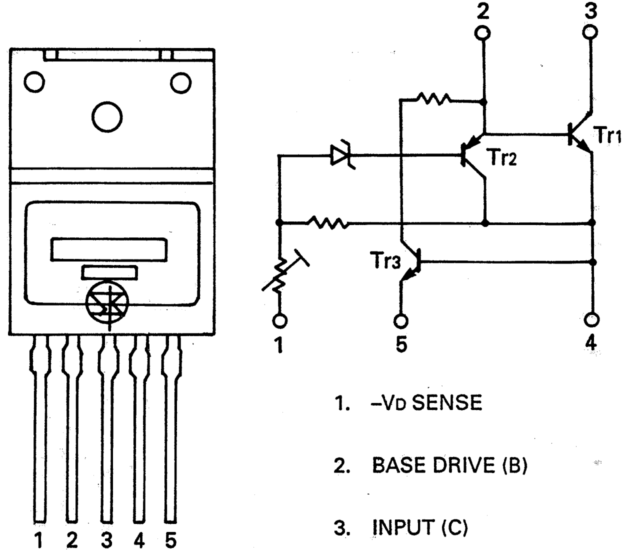
Pin Assignment

1. A OUTPUT
2. A−INPUT
3. A+INPUT
4. GND
5. B+INPUT
6. B−INPUT
7. B OUTPUT
8. V⁺

■ Equivalent Circuit (2 circuits in a chip)

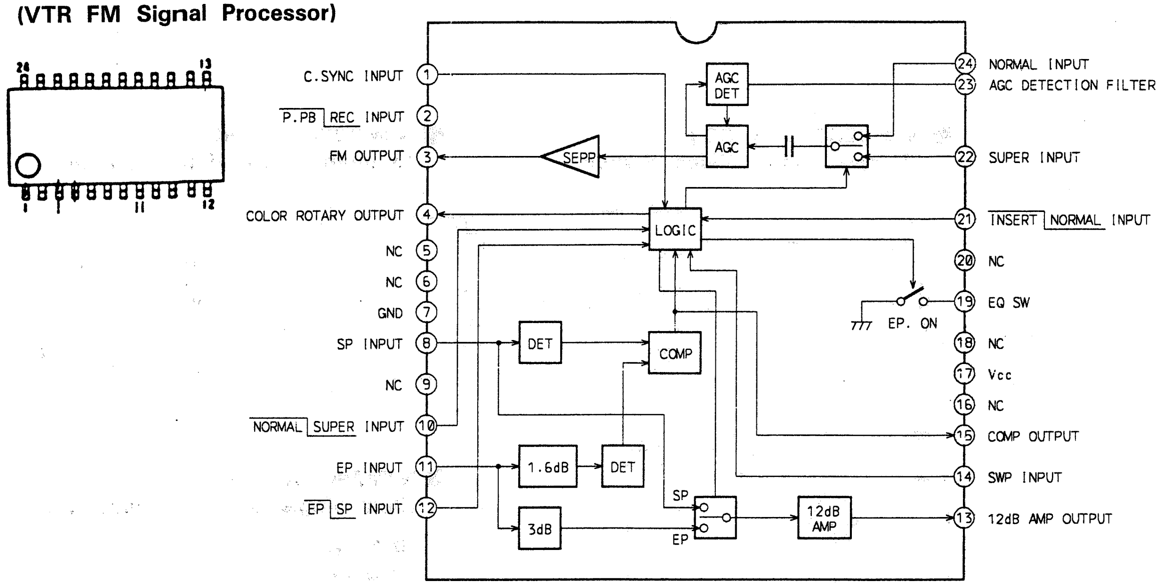

V⁺
INPUTS
−
+
OUTPUT
Vo
GND

## ■ STR-D1706 【SANKEN】
(Voltage Regulator)

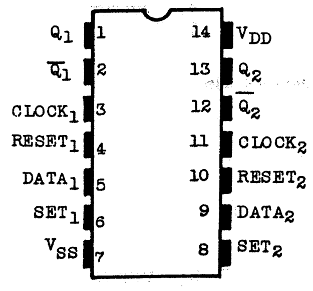

1 2 3 4 5
2
3
Tr1
Tr2
Tr3
1
5
4

1. −VD SENSE
2. BASE DRIVE (B)
3. INPUT (C)
4. EARTH (E)
5. CURRENT DETECTOR

## ■ TA8733F 【TOSHIBA】
(VTR FM Signal Processor)

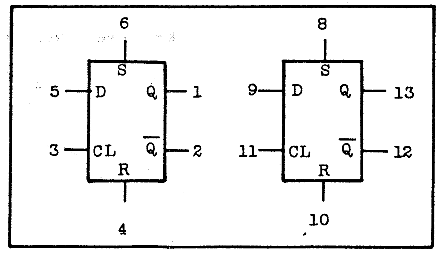

24
13
1
11
12
C.SYNC INPUT ①
P.PB | REC INPUT ②
FM OUTPUT ③
COLOR ROTARY OUTPUT ④
NC ⑤
NC ⑥
GND ⑦
SP INPUT ⑧
NC ⑨
NORMAL | SUPER INPUT ⑩
EP INPUT ⑪
EP | SP INPUT ⑫
AGC DET
AGC
SEPP
LOGIC
DET
COMP
1.6dB
DET
3dB
SP
EP
12dB AMP
EP. ON
㉔ NORMAL INPUT
㉓ AGC DETECTION FILTER
㉒ SUPER INPUT
㉑ INSERT | NORMAL INPUT
⑳ NC
⑲ EQ SW
⑱ NC
⑰ Vcc
⑯ NC
⑮ COMP OUTPUT
⑭ SWP INPUT
⑬ 12dB AMP OUTPUT

## ■ TC4013BP 【TOSHIBA】
(Dual D-Type Flip Flop)


Q1 1
Q̄1 2
CLOCK1 3
RESET1 4
DATA1 5
SET1 6
VSS 7
14 VDD
13 Q2
12 Q̄2
11 CLOCK2
10 RESET2
9 DATA2
8 SET2

(TOP VIEW)

BLOCK DIAGRAM

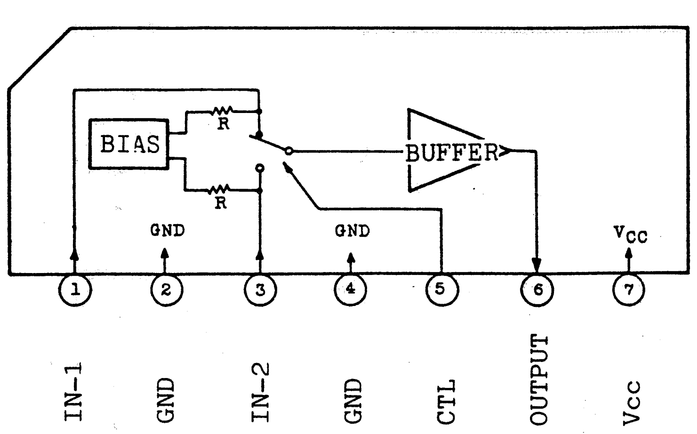

6
S
5 D
Q 1
3 CL
Q̄ 2
R
4
8
S
9 D
Q 13
11 CL
Q̄ 12
R
10

TRUTH TABLE

| INPUTS | | | | OUTPUTS | |
|---|---|---|---|---|---|
| RESET | SET | DATA | CLOCK △ | Qn+1 | Q̄n+1 |
| L | H | ✻ | ✻ | H | L |
| H | L | ✻ | ✻ | L | H |
| H | H | ✻ | ✻ | H | H |
| L | L | L | ↑ | L | H |
| L | L | H | ↑ | H | L |
| L | L | ✻ | ↓ | Qn• | Q̄n• |

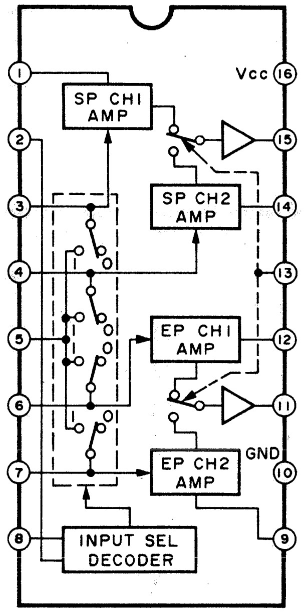
✻ : Don't Care
△ : Level Change
• : No Change

## ■ TA7347P 【TOSHIBA】
(2-Input Switch)


BIAS
R
R
BUFFER
GND
GND
VCC
1
2
3
4
5
6
7
IN-1
GND
IN-2
GND
CTL
OUTPUT
Vcc

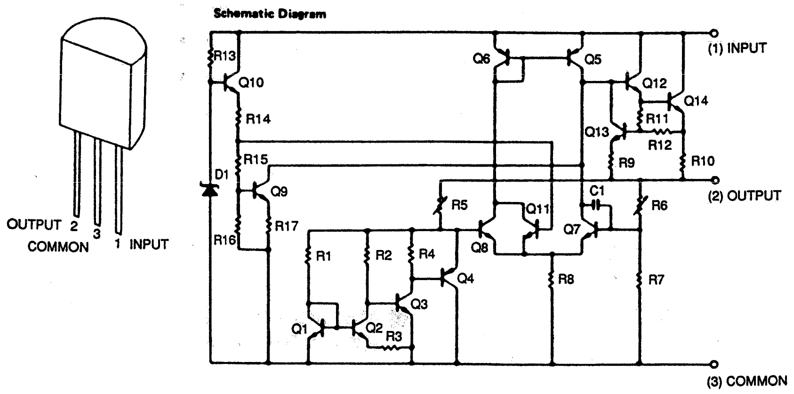
## ■ TA78L009AP 【TOSHIBA】
(See TA78L005AP.)
(+9V)

## ■ TA8609P 【TOSHIBA】
(4-Ch PRE AMP)


1
2
3
4
5
6
7
8
Vcc 16
15
14
13
12
11
GND 10
9
SP CH1 AMP
SP CH2 AMP
EP CH1 AMP
EP CH2 AMP
INPUT SEL DECODER

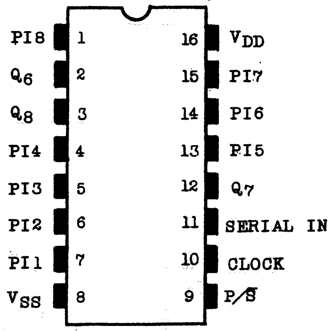
## ■ TA78L005AP 【TOSHIBA】
(3-Terminal Positive Voltage Regulator (+5V))

Schematic Diagram


OUTPUT 2
COMMON 3
1 INPUT
(1) INPUT
(2) OUTPUT
(3) COMMON
R13
Q10
R14
R15
D1
Q9
R16
R17
Q6
Q5
Q12
Q14
R11
Q13
R12
R9
R10
R5
Q11
C1
R6
Q8
Q7
R1
R2
R4
Q4
Q3
Q1
Q2
R3
R8
R7

TA78L005AP→ 5 V
TA78L012AP→12V

## ■ TC4021BP 【TOSHIBA】
(8 Stage Static Shift Register)


PI8 1
Q6 2
Q8 3
PI4 4
PI3 5
PI2 6
PI1 7
VSS 8
16 VDD
15 PI7
14 PI6
13 PI5
12 Q7
11 SERIAL IN
10 CLOCK
9 P/S̄

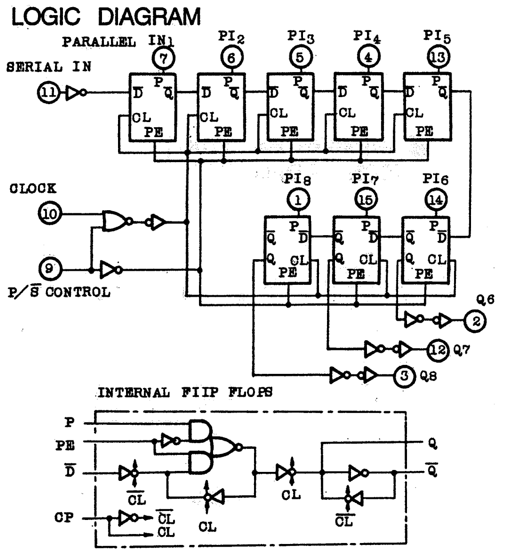
(TOP VIEW)

TRUTH TABLE

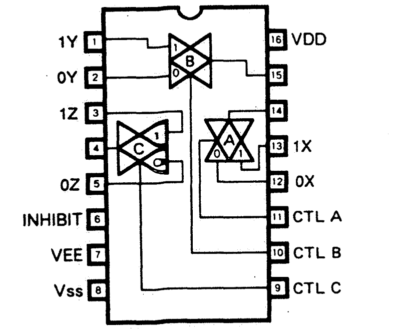
| INPUTS | | | | | OUTPUTS △ | |
|---|---|---|---|---|---|---|
| CLOCK △△ | P/S̄ | PI1 | PIn | SI | Q1 | Qn |
| ↑ | L | ※ | ※ | L | L | Qn−1 |
| ↑ | L | ※ | ※ | H | H | Qn−1 |
| ↓ | L | ※ | ※ | ※ | No Change | |
| ※ | H | L | L | ※ | L | L |
| ※ | H | L | H | ※ | L | H |
| ※ | H | H | L | ※ | H | L |
| ※ | H | H | H | ※ | H | H |

n ; 2 ~ 8
△ ; $Q_1$ ~ $Q_5$ Internal
△△ ; Level
※ ; Don't Care

LOGIC DIAGRAM


PARALLEL IN PI1 7
PI2 6
PI3 5
PI4 4
PI5 13
SERIAL IN 11
CLOCK 10
P/S̄ CONTROL 9
PI8 1
PI7 15
PI6 14
Q6 2
Q7 12
Q8 3
INTERNAL FLIP FLOPS
P
PE
D
CP
CL
Q
Q̄

## ■ TC4053BP 【TOSHIBA】
(Triple 2 Channel Analog Multiplexers/ Demultiplexers)

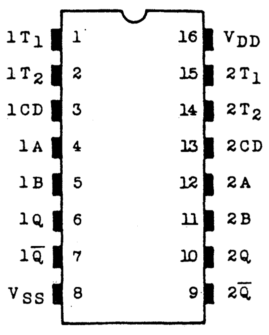

1Y 1
0Y 2
1Z 3
4
0Z 5
INHIBIT 6
VEE 7
Vss 8
16 VDD
15
14
13 1X
12 0X
11 CTL A
10 CTL B
9 CTL C
A
B
C

(TOP VIEW)

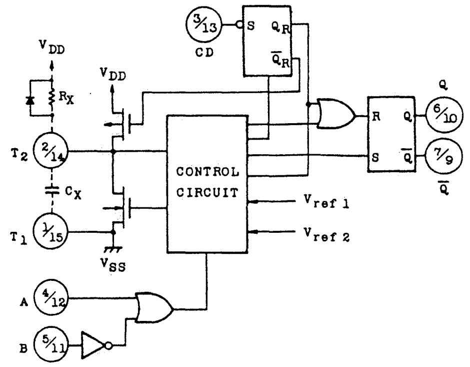
TRUTH TABLE

| CONTROL INPUTS | | | | "ON" CHANNEL |
|---|---|---|---|---|
| INHIBIT | C | B | A | 4053BP<br>4053BF |
| L | L | L | L | 0X, 0Y, 0Z |
| L | L | L | H | 1X, 0Y,0Z |
| L | L | H | L | 0X, 1Y, 0Z |
| L | L | H | H | 1X, 1Y, 0Z |
| L | H | L | L | 0X, 0Y, 1Z |
| L | H | L | H | 1X, 0Y, 1Z |
| L | H | H | L | 0X, 1Y, 1Z |
| L | H | H | H | 1X, 1Y, 1Z |
| H | * | * | * | NOTE |
| * Don't Care, | | | | |

## ■ TC4538BP 【TOSHIBA】
(Dual Precision Monostable Multivibrator)


1T1 1
1T2 2
1CD 3
1A 4
1B 5
1Q 6
1Q̄ 7
VSS 8
16 VDD
15 2T1
14 2T2
13 2CD
12 2A
11 2B
10 2Q
9 2Q̄

(TOP VIEW)


VDD
RX
CX
T2 2/14
T1 1/15
VSS
CD 3/13
CONTROL CIRCUIT
Vref 1
Vref 2
A 4/12
B 5/11
S QR
Q̄R
R Q
S Q̄
Q 6/10
Q̄ 7/9

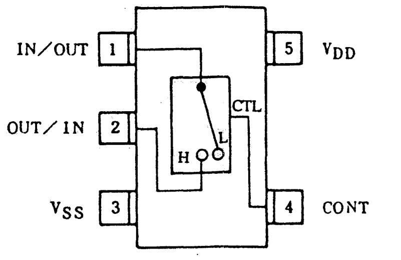
TRUTH TABLE

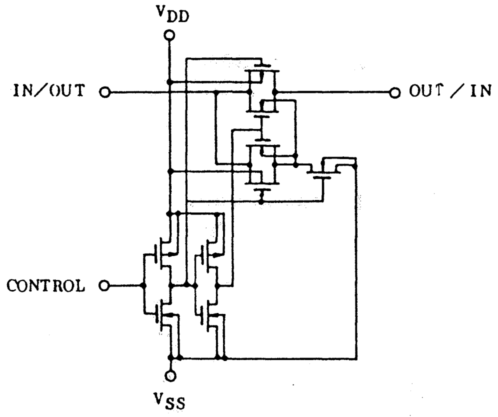
| INPUT | | | OUTPUT | | NOTE |
|---|---|---|---|---|---|
| A | B | CD | Q | $\overline{Q}$ | |
| ↑ | H | H | ⊓ | ⊔ | OUTPUT ENABLE |
| ↑ | L | H | L | H | INHIBIT |
| H | ↓ | H | L | H | INHIBIT |
| L | ↓ | H | ⊓ | ⊔ | OUTPUT ENABLE |
| * | * | L | L | H | INHIBIT |

* Don't Care

## ■ TC4S66F 【TOSHIBA】
(Bilateral Switch)

( TOP VIEW )


IN/OUT 1
OUT/IN 2
VSS 3
5 VDD
4 CONT
CTL
H
L

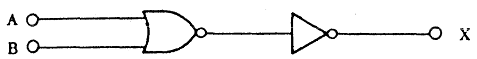

VDD
IN/OUT
OUT/IN
CONTROL
VSS

| CONTROL | IMPEDANCE BETWEEN IN/OUT-OUT/IN * |
|---|---|
| H | 0.5～5 × $10^2$ Ω |
| L | > $10^9$ Ω |

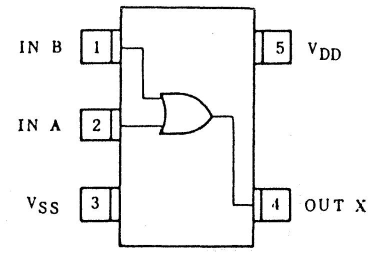
※ See Electrical Characteristics

## ■ TC4S71F 【TOSHIBA】
(2-Input OR Gate)

X = A + B

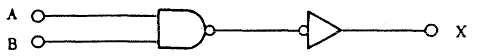


(TOP VIEW)

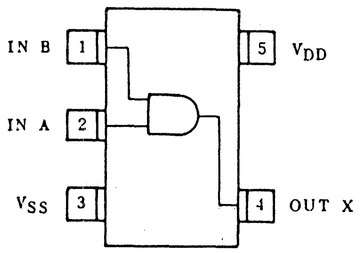

IN B 1
IN A 2
VSS 3
5 VDD
4 OUT X

## ■ TC4S81F 【TOSHIBA】
(2-Input AND Gate)

X = A · B

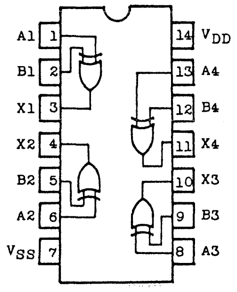


(TOP VIEW)


IN B 1
IN A 2
VSS 3
5 VDD
4 OUT X

## ■ UPD4013BG 【NEC】
(See TC4013BP.)

## ■ UPD4030BG 【NEC】
(Quad 2 Input Exclusive OR Gate)

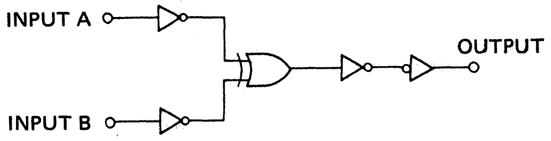

A1 1
B1 2
X1 3
X2 4
B2 5
A2 6
VSS 7
14 VDD
13 A4
12 B4
11 X4
10 X3
9 B3
8 A3

TOP VIEW

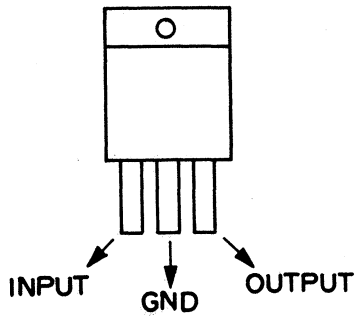
TRUTH TABLE

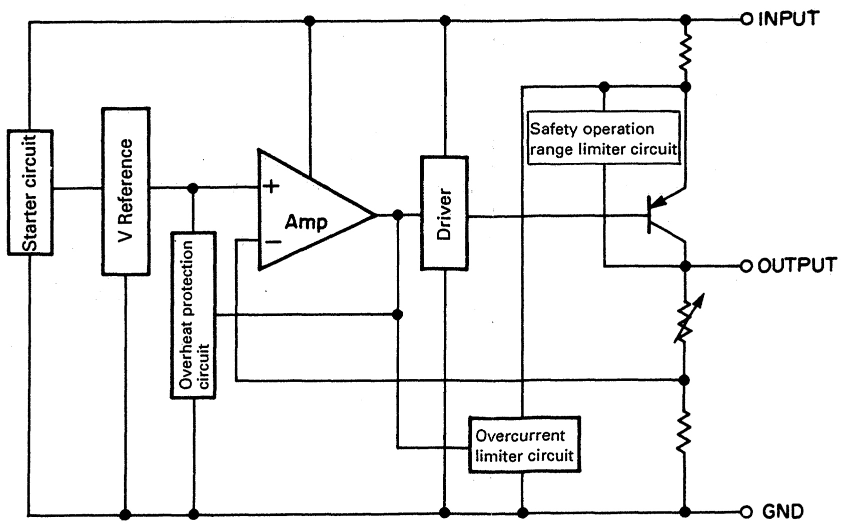
| INPUT | | OUTPUT |
|---|---|---|
| A | B | X |
| L | L | L |
| L | H | H |
| H | L | H |
| H | H | L |

BLOCK DIAGRAM


INPUT A
INPUT B
OUTPUT

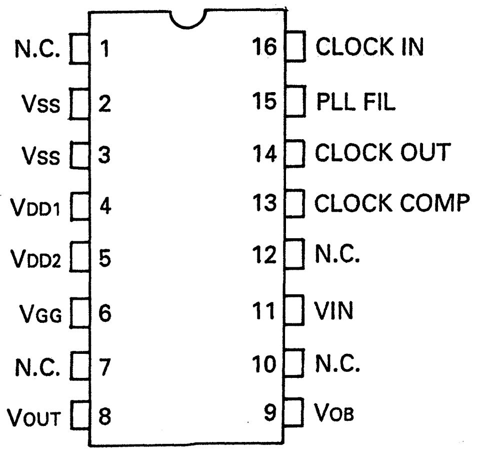
## ■ UPC2405HF 【NEC】
(3-Terminal Positeve Voltage Regulator (+5V))

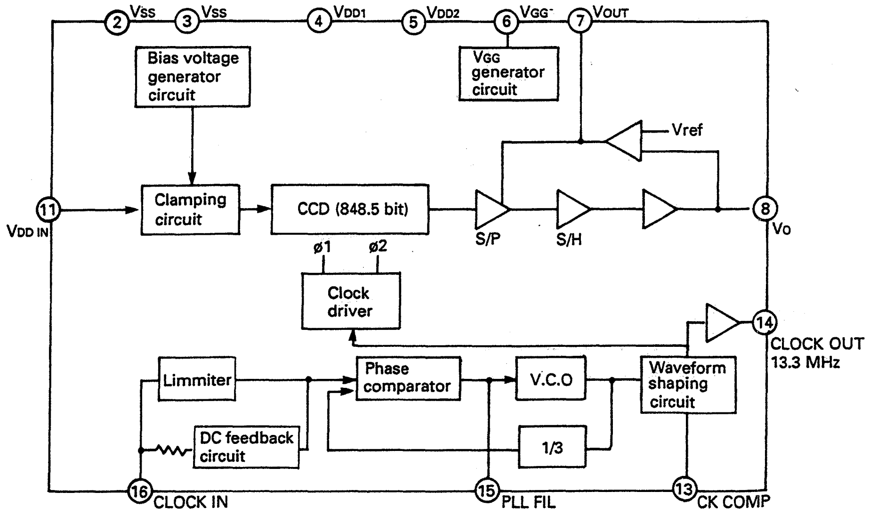

INPUT
GND
OUTPUT


INPUT
Starter circuit
V Reference
Overheat protection circuit
Amp
+
−
Driver
Safety operation range limiter circuit
Overcurrent limiter circuit
OUTPUT
GND

## ■ TL8827P 【TOSHIBA】
(PAL 1H CCD Delayline)

(Top View)

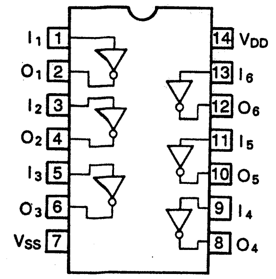

N.C. 1
Vss 2
Vss 3
VDD1 4
VDD2 5
VGG 6
N.C. 7
VOUT 8
16 CLOCK IN
15 PLL FIL
14 CLOCK OUT
13 CLOCK COMP
12 N.C.
11 VIN
10 N.C.
9 VOB


② Vss
③ Vss
④ VDD1
⑤ VDD2
⑥ VGG
⑦ VOUT
Bias voltage generator circuit
VGG generator circuit
Vref
⑪ VDD IN
Clamping circuit
CCD (848.5 bit)
S/P
S/H
⑧ Vo
ø1
ø2
Clock driver
⑭ CLOCK OUT 13.3 MHz
Limmiter
Phase comparator
V.C.O
Waveform shaping circuit
DC feedback circuit
1/3
⑯ CLOCK IN
⑮ PLL FIL
⑬ CK COMP

## ■ UPD4052BG 【NEC】
(See MN4052BS.)

## ■ UPD4053BG 【NEC】
(See TC4053BP.)

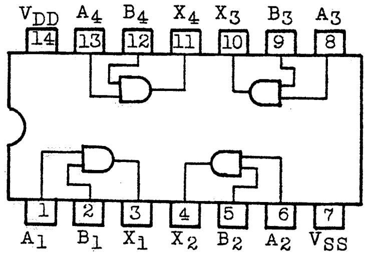
## ■ UPD4069UBG 【NEC】
(Hex Inverter)



I1 1
O1 2
I2 3
O2 4
I3 5
O3 6
Vss 7
14 VDD
13 I6
12 O6
11 I5
10 O5
9 I4
8 O4

(Top View)

## ■ UPD4081BG 【NEC】
(Quad 2 Input AND Gate)



VDD A4 B4 X4 X3 B3 A3
14 13 12 11 10 9 8
1 2 3 4 5 6 7
A1 B1 X1 X2 B2 A2 VSS

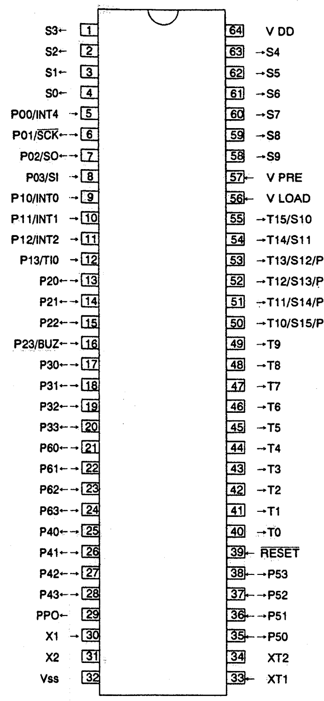
(TOP VIEW)

**TRUTH TABLE**

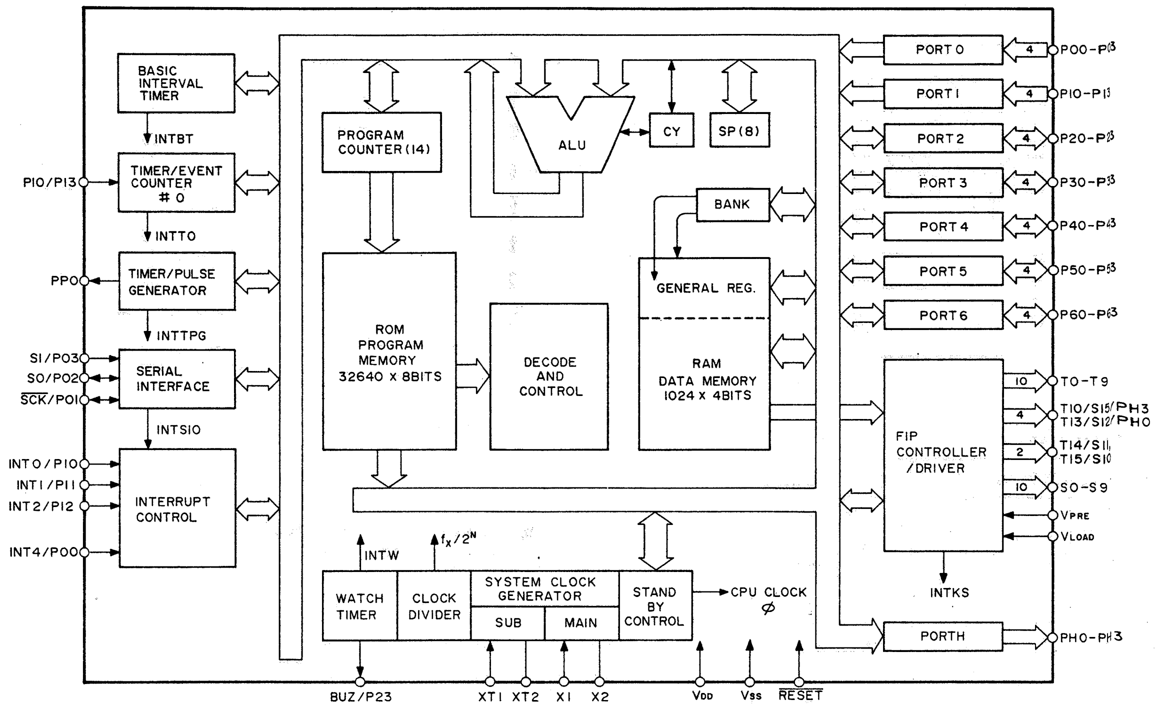
| A | B | X |
|---|---|---|
| L | L | L |
| L | H | L |
| H | L | L |
| H | H | H |

## ■ UPD4538BG 【NEC】
(See TC4538BP.)

## ■ UPD75P218C-248B 【NEC】
(8-Bit Microcomputer)



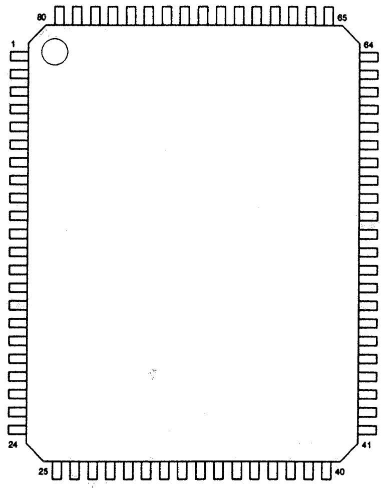
S3← 1
S2← 2
S1← 3
S0← 4
P00/INT4 → 5
P01/SCK←→ 6
P02/SO←→ 7
P03/SI → 8
P10/INT0 → 9
P11/INT1 → 10
P12/INT2 → 11
P13/TI0 → 12
P20←→ 13
P21←→ 14
P22←→ 15
P23/BUZ←→ 16
P30←→ 17
P31←→ 18
P32←→ 19
P33←→ 20
P60←→ 21
P61←→ 22
P62←→ 23
P63←→ 24
P40←→ 25
P41←→ 26
P42←→ 27
P43←→ 28
PPO← 29
X1 → 30
X2 31
Vss 32
64 V DD
63 →S4
62 →S5
61 →S6
60 →S7
59 →S8
58 →S9
57← V PRE
56← V LOAD
55 →T15/S10
54 →T14/S11
53 →T13/S12/PH0
52 →T12/S13/PH1
51 →T11/S14/PH2
50 →T10/S15/PH3
49 →T9
48 →T8
47 →T7
46 →T6
45 →T5
44 →T4
43 →T3
42 →T2
41 →T1
40 →T0
39← RESET
38←→P53
37←→P52
36←→P51
35←→P50
34 XT2
33← XT1



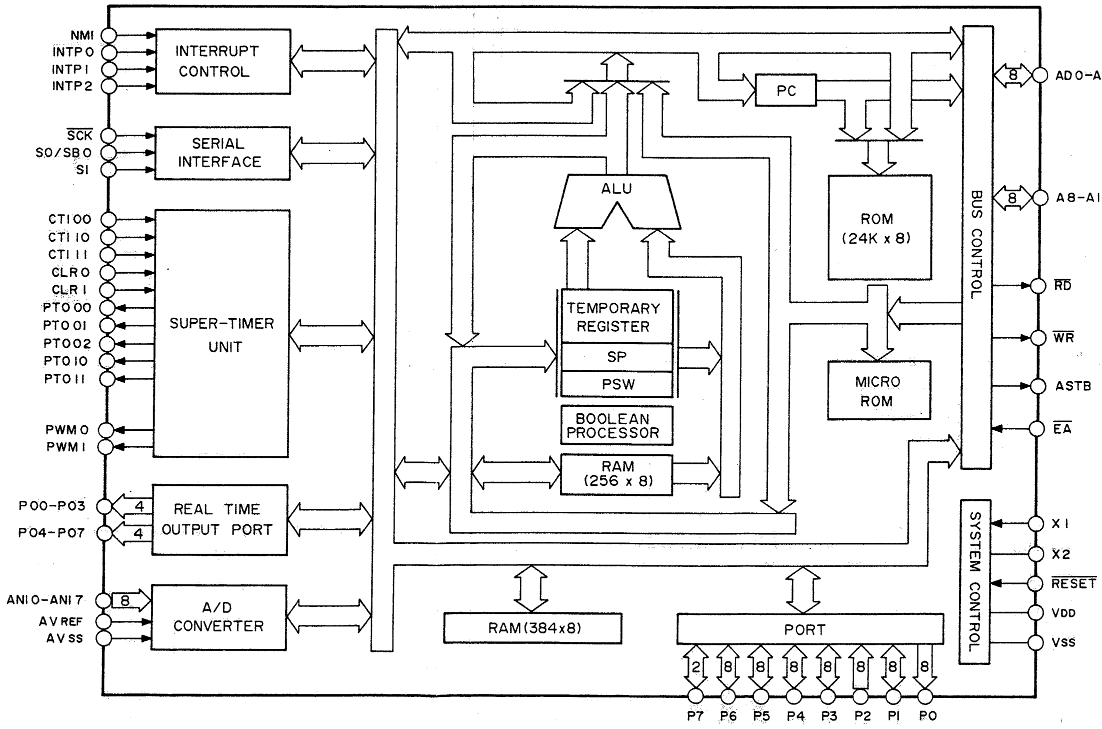
BASIC INTERVAL TIMER
INTBT
PI0/PI3
TIMER/EVENT COUNTER #0
INTT0
PPO
TIMER/PULSE GENERATOR
INTTPG
SI/P03
SO/P02
SCK/P01
SERIAL INTERFACE
INTSIO
INT0/PI0
INT1/PI1
INT2/PI2
INT4/P00
INTERRUPT CONTROL
PROGRAM COUNTER (14)
ALU
CY
SP (8)
BANK
GENERAL REG.
ROM PROGRAM MEMORY 32640 x 8BITS
DECODE AND CONTROL
RAM DATA MEMORY 1024 x 4BITS
INTW
fx/2N
WATCH TIMER
CLOCK DIVIDER
SYSTEM CLOCK GENERATOR
SUB
MAIN
STAND BY CONTROL
CPU CLOCK
ϕ
BUZ/P23
XT1
XT2
X1
X2
VDD
Vss
RESET
PORT 0
PORT 1
PORT 2
PORT 3
PORT 4
PORT 5
PORT 6
4
P00-P03
P10-P13
P20-P23
P30-P33
P40-P43
P50-P53
P60-P63
FIP CONTROLLER /DRIVER
10
T0-T9
4
T10/S15/PH3
T13/S12/PH0
2
T14/S11
T15/S10
10
S0-S9
VPRE
VLOAD
INTKS
PORTH
PH0-PH3

## ■ UPD78138GF-023 【NEC】
(8-Bit Microcomputer)

| PIN NO. | PIN NAME | IN/OUT | PIN NO. | PIN NAME | IN/OUT |
|---|---|---|---|---|---|
| 1 | P34/CLR0 | IN | 41 | P07 | OUT |
| 2 | P35/SI | IN | 42 | P67 | IN/OUT |
| 3 | P36/SO/SB0 | IN/OUT | 43 | P66 | IN/OUT |
| 4 | P37/SCK | IN/OUT | 44 | P65/WR | IN/OUT |
| 5 | P20/NMI | IN | 45 | P64/RD | IN/OUT |
| 6 | P21/INTP0 | IN | 46 | P63 | OUT |
| 7 | P22/INTP1 | IN | 47 | P62 | OUT |
| 8 | P23/INTP2 | IN | 48 | P61 | OUT |
| 9 | P24/CTI10 | IN | 49 | P60 | OUT |
| 10 | P25/CTI00 | IN | 50 | P57/A15 | IN/OUT |
| 11 | P26/CTI11 | IN | 51 | P56/A14 | IN/OUT |
| 12 | P27/CLR1 | IN | 52 | P55/A13 | IN/OUT |
| 13 | P30/PTO00 | IN/OUT | 53 | P54/A12 | IN/OUT |
| 14 | P31/PTO01 | IN/OUT | 54 | P53/A11 | IN/OUT |
| 15 | P32/PTO02 | IN/OUT | 55 | P52/A10 | IN/OUT |
| 16 | P33/PTO11 | IN/OUT | 56 | P51/A9 | IN/OUT |
| 17 | PWM0 | OUT | 57 | P50/A8 | IN/OUT |
| 18 | PWM1 | OUT | 58 | P47/AD7 | IN/OUT |
| 19 | AVss | – | 59 | P46/AD6 | IN/OUT |
| 20 | AVREF | – | 60 | P45/AD5 | IN/OUT |
| 21 | ANI0 | IN | 61 | P44/AD4 | IN/OUT |
| 22 | ANI1 | IN | 62 | P43/AD3 | IN/OUT |
| 23 | ANI2 | IN | 63 | P42/AD2 | IN/OUT |
| 24 | ANI3 | IN | 64 | P41/AD1 | IN/OUT |
| 25 | ANI4 | IN | 65 | P40/AD0 | IN/OUT |
| 26 | ANI5 | IN | 66 | ASTB/CLO | OUT |
| 27 | ANI6 | IN | 67 | Vss | – |
| 28 | ANI7 | IN | 68 | EA | IN |
| 29 | RESET | IN | 69 | P10 | IN/OUT |
| 30 | VDD | – | 70 | P11 | IN/OUT |
| 31 | X2 | – | 71 | P12 | IN/OUT |
| 32 | X1 | IN | 72 | P13 | IN/OUT |
| 33 | Vss | – | 73 | P14 | IN/OUT |
| 34 | P00 | OUT | 74 | P15 | IN/OUT |
| 35 | P01 | OUT | 75 | P16 | IN/OUT |
| 36 | P02 | OUT | 76 | P17 | IN/OUT |
| 37 | P03 | OUT | 77 | VDD | – |
| 38 | P04 | OUT | 78 | P70 | IN/OUT |
| 39 | P05 | OUT | 79 | P71 | IN/OUT |
| 40 | P06 | OUT | 80 | PTO10 | OUT |



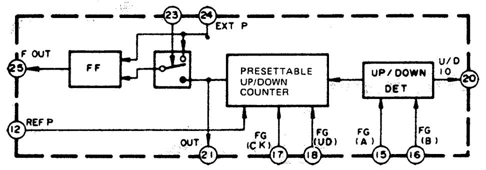
80
65
1
64
24
41
25
40



NMI
INTP0
INTP1
INTP2
INTERRUPT CONTROL
SCK
SO/SB0
SI
SERIAL INTERFACE
CTI00
CTI10
CTI11
CLR0
CLR1
PTO00
PTO01
PTO02
PTO10
PTO11
SUPER-TIMER UNIT
PWM0
PWM1
P00-P03
P04-P07
4
4
REAL TIME OUTPUT PORT
ANI0-ANI7
AVREF
AVSS
8
A/D CONVERTER
PC
ALU
ROM (24K x 8)
TEMPORARY REGISTER
SP
PSW
BOOLEAN PROCESSOR
RAM (256 x 8)
MICRO ROM
RAM(384x8)
PORT
BUS CONTROL
SYSTEM CONTROL
8
AD0-AD7
8
A8-A15
RD
WR
ASTB
EA
X1
X2
RESET
VDD
VSS
2 8 8 8 8 8 8 8
P7 P6 P5 P4 P3 P2 P1 P0

## ■ UPD78P138GF019C 【NEC】
(See UPD78138GF-023.)

## ■ VC2032 【JVC】
(Counter)



23
24
EXT P
F OUT
25
FF
PRESETTABLE UP/DOWN COUNTER
UP/DOWN DET
U/D IO
20
12
REF P
OUT
21
FG (CK)
17
FG (UD)
18
FG (A)
15
FG (B)
16

# SECTION 5
# EXPLODED VIEWS AND PARTS LIST

## SAFETY PRECAUTION

**Parts identified by the ⚠ symbol are critical for safety.**
**Replace only with specified part numbers.**

Page

5.1 STANDARD PART NUMBER CODING
  5.1.1 Screw coding .......... 5 - 2
  5.1.2 Fuse coding .......... 5 - 3

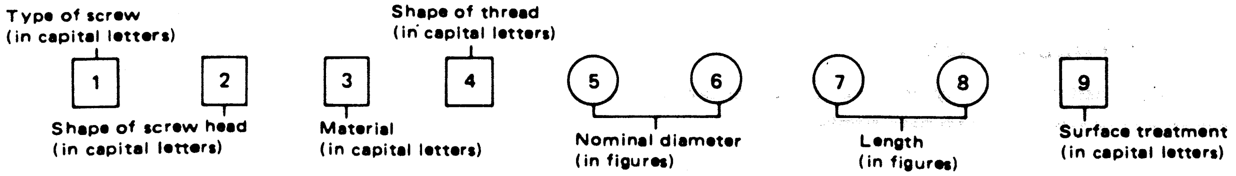
5.2 EXPLODED VIEWS AND PARTS LIST
  5.2.1 Packing assembly <M1> .......... 5 - 3
  5.2.2 Cabinet assembly <M2> .......... 5 - 4
  5.2.3 Chassis assembly <M3> .......... 5 - 5
  5.2.4 Mechanism assembly <M4> .......... 5 - 6

**Note:** " X " indicates quantity per set.

## 5.1 STANDARD PART NUMBER CODING

### 5.1.1 Screw coding

Standard screw part numbers are as follows.


Type of screw
(in capital letters)
Shape of thread
(in capital letters)
1
2
3
4
5
6
7
8
9
Shape of screw head
(in capital letters)
Material
(in capital letters)
Nominal diameter
(in figures)
Length
(in figures)
Surface treatment
(in capital letters)

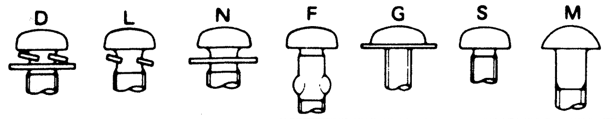
**Type of screw (first digit)**

| | |
|---|---|
| S | Normal screws |
| D | Assembled machine screws (with plain and spring washers) |
| L | " (with spring washer) |
| N | " (with plain washer) |
| F | Feather screws |
| G | Washer head tapping screws |
| M | Wood screws |

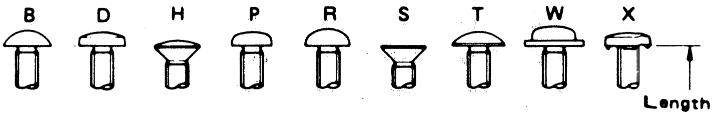
**Shape of screw head (second digit)**

| | |
|---|---|
| B | Brazier head |
| D | Binding head |
| H | Oval countersunk head |
| P | Pan head |
| R | Round head |
| S | Flat head |
| T | Truss head |
| W | Washer head (machine screws) |
| X | Toothed head |

**–Type of screw (first digit) –**



**– Shape of screw head (second digit) –**


B
D
H
P
R
S
T
W
X
Length

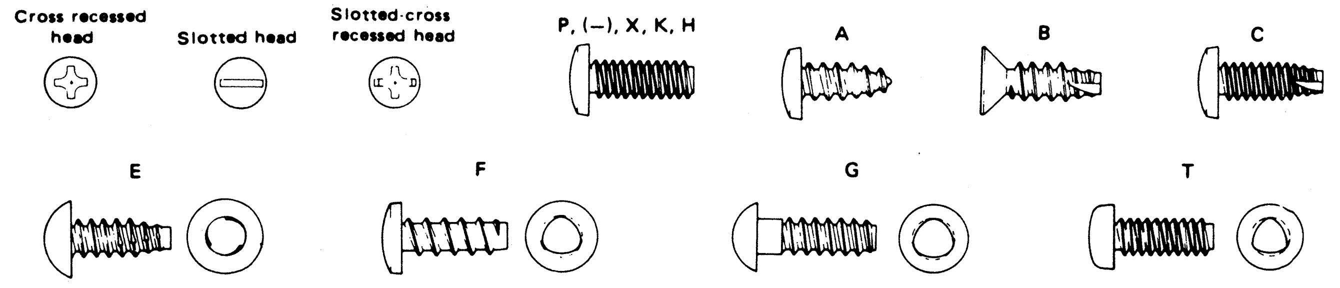
**Material (third digit)**

| | |
|---|---|
| S | Steel |
| E | Stainless steel |
| C | Cast iron |
| U | Copper |
| B | Brass |
| P | Phosphor bronze |
| N | Nickel silver |
| Y | Cast brass |
| A | Aluminum |
| Z | Zinc alloy |
| K | Polycarbonate |

**Shape of thread (fourth digit)**

| | |
|---|---|
| P | Cross recessed head screws |
| (–) | Slotted head machine screws |
| X | Slotted-cross recessed head machine screws |
| K | Cross recessed head machine screws for precision equipment (type 1) |
| H | " (type 3) |
| A | Cross recessed head tapping screws (type 1) |
| B | " (type 2) |
| C | " (type 3) |
| E | Cross recessed head special tapping screws (brand : evertight) |
| F | " (brand : P-tight) |
| T | " (brand : taptight) |
| G | " |

**– Shape of thread (fourth digit) –**


Cross recessed head
Slotted head
Slotted-cross recessed head
P, (–), X, K, H
A
B
C
E
F
G
T

**Nominal diameter (fifth and sixth digits)**

The fifth and sixth digits are numbers indicating a nominal diameter or dimension. If the dimension exceeds 10 mm, three digits are used. The number indicates a nominal diameter or dimension, given in millimeters, multiplied by ten.

**Length (seventh and eighth digits)**

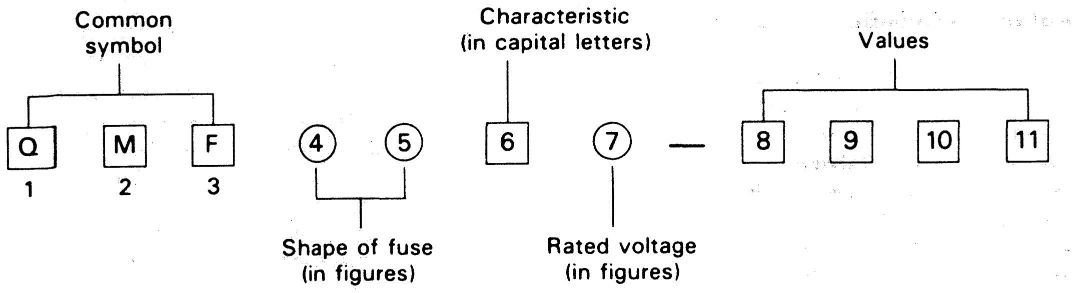
The seventh and eighth digits are numbers indicating length in milimeters. The preceding figure is zero when the dimension is smaller than 10 mm. For machine screws used in precision equipment whose length is given in units of 0.1 mm, the number indicates ten times the size of their length.

**Surface treatment (ninth digit)**

| | |
|---|---|
| Z | Dichromate treatment after galvanizing (MFZn II-C) |
| N | Nickel plating (MFNi II, MFNi I) |
| R | Chromium plating (MBCr II, MBCr I) |
| G | Silver plating (SP4) |
| B | Black coating after plating |
| F | Blackening of iron (FB) |
| M | Blackening after galvanizing |
| K | Pickling of brass (PF2) |
| P | Phosphate treatment |
| W | Uni-chrome plating |
| L | Coating with transparent paint |
| A | Coloring red after galvanizing (MFZn II-C) |
| C | Coloring blue after galvanizing (MFZn II-C) |
| T | Coloring green after galvanizing (MFZn II-C) |
| V | Coloring purple after galvanizing (MFZn II-C) |

### 5.1.2 Fuse coding

**Standard fuse part numbers are as follows.**


Common symbol
Characteristic (in capital letters)
Values
Q
M
F
1
2
3
④
⑤
6
⑦
—
8
9
10
11
Shape of fuse (in figures)
Rated voltage (in figures)

**Shape of fuse**
**(fourth and fifth digits)**

| | |
|---|---|
| 51 | ϕ5.2×20 mm |
| 60 | ϕ6.4×30 mm |
| 61 | ϕ6.35×31.8 mm |
| 63 | ϕ6.4×30 mm with lead wires |
| 66 | ϕ6.35×31.8 mm with lead wires |
| 00 | Special type |

**Rated voltage**
**(seventh digit)**

| | |
|---|---|
| 1 | AC125 V |
| 2 | AC250 V |
| 3 | 0.1−1 A : AC250 V<br>1.25−6.3 A : AC125 V |

**Values**
**(eighth-tenth or eleventh digits)**
example:

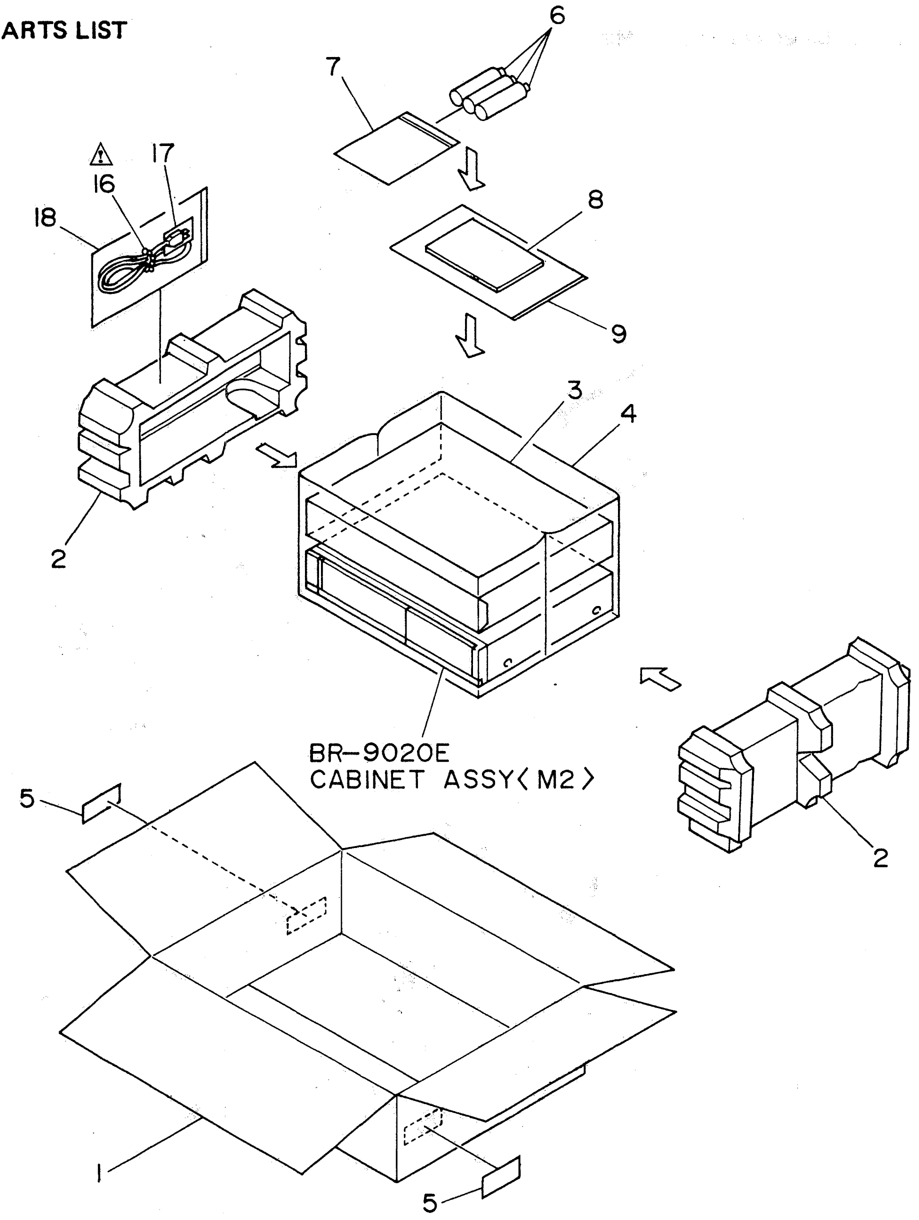
| | |
|---|---|
| R63 | ......... 0.63 A |
| 1R0 | ......... 1.0 A |
| 2R5 | ......... 2.5 A |
| 100 | ........ 10 A |
| R315 | ......... 0.315 A |
| 1R25 | ......... 1.25 A |

**Characteristics (sixth digit)**

| Symbol | Fusing Current | Fusing Time | Remarks |
|---|---|---|---|
| A | 210 % | Within 2 min. | Anti-rush type (for Europe) |
| | 275 % | 0.6 − 10 sec. | |
| | 400 % | 0.15 − 3 sec. | |
| | 1000 % | 0.02 − 0.3 sec. | |
| B | 210 % | Within 30 min. | Regular fusible type (for SEMKO, Europe) |
| | 275 % | 0.05 − 2 sec. | |
| | 400 % | 0.01 − 0.3 sec. | |
| C | 135 % | Within 1 hr. | Regular fusible type (for UL, Japan) |
| | 200 % | Within 2 min. | |
| E | 210 % | Within 2 min. | Anti-rush type (for Europe) |
| | 275 % | 0.6 − 10 sec. | |
| | 400 % | 0.15 − 3 sec. | |
| | 1000 % | 0.02 − 0.3 sec. | |
| J | 135 % | Within 1 hr. | Anti-rush type |
| | 200 % | Within 2 min. | |
| M | 135 % | Within 1 hr. | Regular fusible type (for UL) |
| | 200 % | Within 2 min. | |
| R | 160 % | Within 1 hr. | Regular fusible type |
| | 200 % | Within 2 min. | |
| S | 160 % | Within 1 hr. | Anti-rush type |
| | 200 % | Within 2 min. | |
| | 700 % − 2000 % | Within 0.01 sec. | |
| U | 135 % | Within 1 hr. | Anti-rush type (for UL) |
| | 200 % | Within 2 min. | |
| | 800 % − 2000 % | Within 0.01 sec. | |

## 5.2 EXPLODED VIEWS AND PARTS LIST

### 5.2.1 Packing assembly <M1>



When Shipped from the factory the switches and VR's are set as shown below tables.

- **FRONT PANEL**

| NAME | OPSITION |
|---|---|
| AUTO REC SW | OFF |
| VISS SW | OFF |
| ALARM REC SW | OFF |
| COUNTER HEMORY SW | OFF |
| REPEAT REC/PLAY SW | OFF |
| VHS VIDEO MODE SW | AUTO |
| REMOTE SW | LOCAL |
| SHARPNESS VR | CENTER |
| ON SERRN BRIGHT VR | CENTER |

- **REAR PANEL**

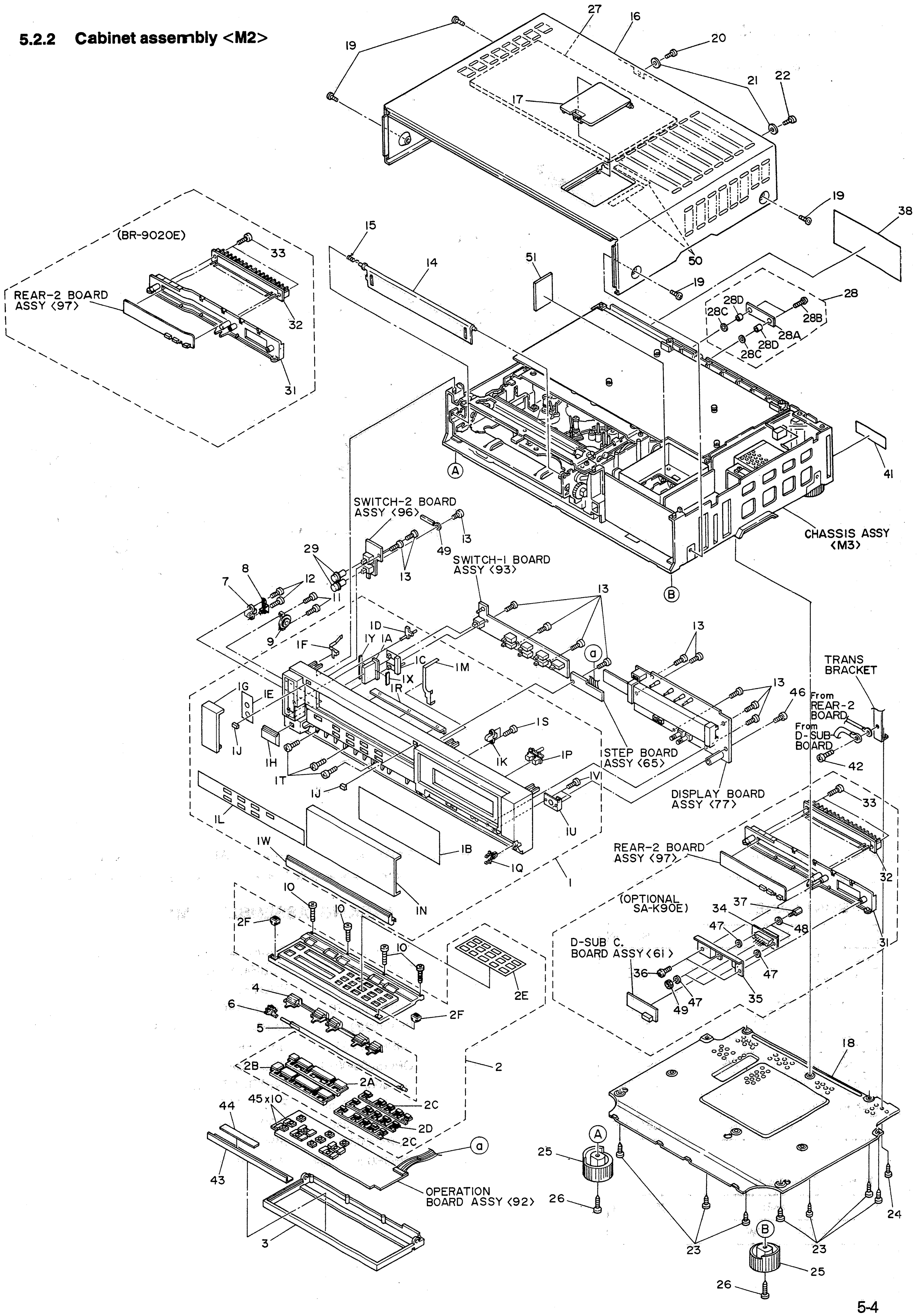
| NAME | POSITION |
|---|---|
| V. PULSE SW | OFF |

| #⚠ REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| ****** | ************ | ************** |

**PACKING ASSEMBLY <M1>**

| #⚠ REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| 1 | PRD20162-15 | PACKING CASE |
| 2 | PQ32590A-1 | CUSHION ASSY |
| 3 | PRD30099 | PROTECT SHEET |
| 4 | PQM30021-70 | POLY BAG |
| 5 | PUP40329 | SERIAL NO.STICKER, X2 |
| 6 | R6PRPA-2ST | BATTERY, X3 |
| 7 | QPGB005-00704 | POLY BAG |
| 8 | SL96003 | INSTRUCTIONS |
| 9 | QPGA025-03505 | POLY BAG |
| ⚠ 16 | QMP4250-250 | POWER CORD |
| 17 | PUP40003-7 | AIR CAP |
| 18 | QPGB020-02804 | POLY BAG |

### 5.2.2 Cabinet assembly <M2>



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28
28D
28C
28B
28A
28D
28C
(BR-9020E)
33
REAR-2 BOARD ASSY <97>
32
31
41
A
CHASSIS ASSY <M3>
B
SWITCH-2 BOARD ASSY <96>
13
49
SWITCH-1 BOARD ASSY <93>
29
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13
1D
1Y 1A
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1R
a
1G
1E
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1J
1T
1S
1K
1P
1V
STEP BOARD ASSY <65>
13
46
TRANS BRACKET
From REAR-2 BOARD
From D-SUB C. BOARD
42
1J
1L
1W
1N
1B
1Q
1U
DISPLAY BOARD ASSY <77>
REAR-2 BOARD ASSY <97>
33
32
31
1
(OPTIONAL SA-K90E)
34
37
47
48
D-SUB C. BOARD ASSY <61>
36
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2F
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10
2E
4
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2F
2
18
2B
2A
44
45x10
2C
2D
2C
a
43
OPERATION BOARD ASSY <92>
3
25
A
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23
B
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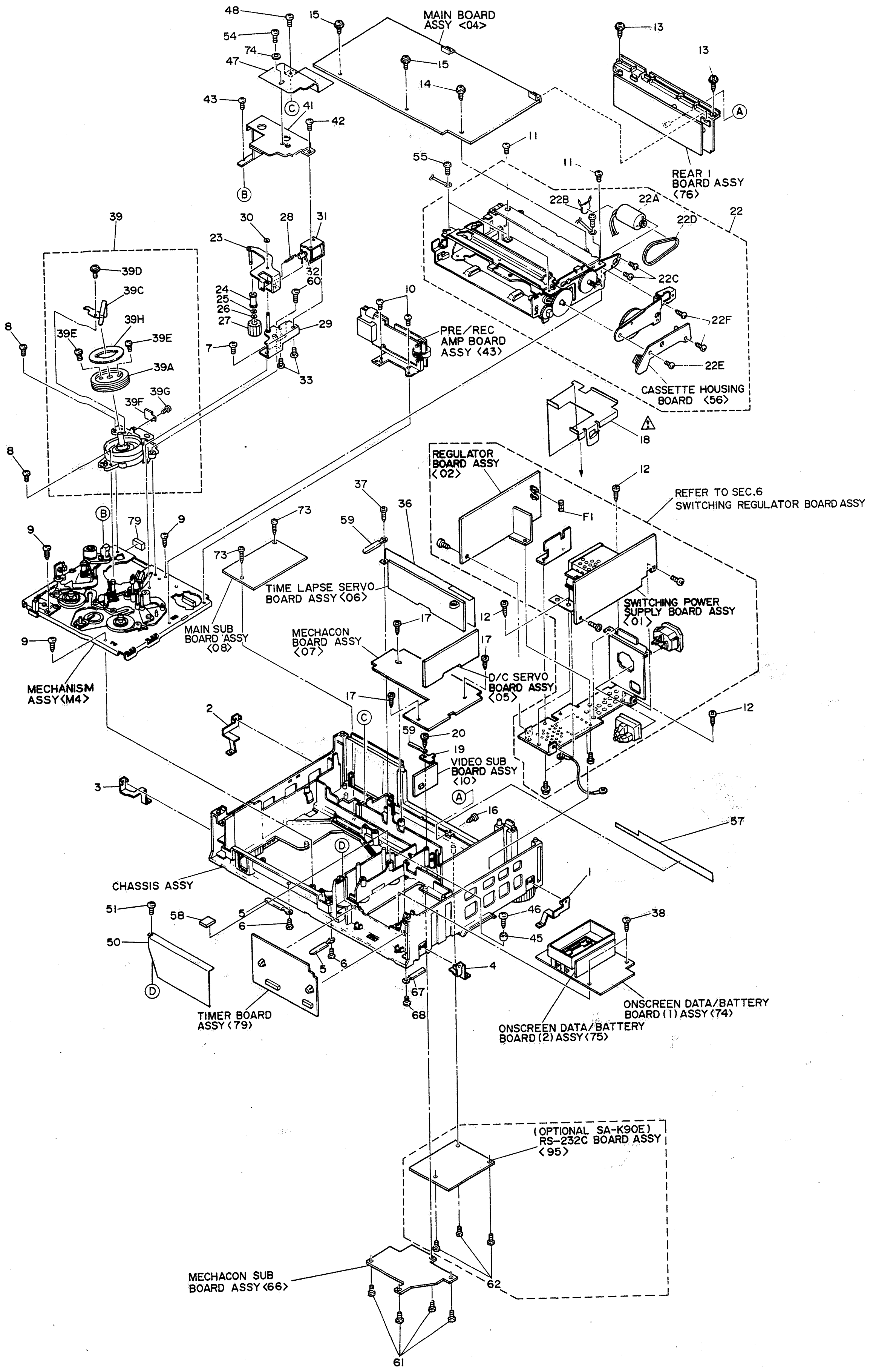
## CABINET ASSEMBLY <M2>

| #⚠ REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| 1 | PRD10266F | FRONT PANEL ASSY |
| 1A | PQ32347-4 | BUTTON (POWER) |
| 1B | PQ32499-20 | DISPLAY SHEET |
| 1C | PQ43395 | HINGE(POWER) |
| 1D | PQ43394 | INDICATOR(POWER) |
| 1E | PQ43486-7 | PLATE (JACK) |
| 1F | PQ43487 | EARTH PLATE |
| 1G | PQ32351-13 | COVER (JACK) |
| 1H | PQ32348-7 | COVER |
| 1J | PQ43363 | PLATE (MAGNET), X2 |
| 1K | PQ43467 | HOLDER |
| 1L | PRD30832F | PLATE ASSY |
| 1M | PQ32395-1-2 | EARTH PLATE |
| 1N | PQ32485 | DISPLAY WINDOW |
| 1P | PQ43455-5 | BUTTON (TR) |
| 1Q | PU60109 | CATCHER |
| 1R | PQ32571 | PLATE(FRONT) |
| 1S | SDSF2608Z | SCREW, X2 |
| 1T | SDSG2606Z | SCREW, X3 |
| 1U | PRD43735 | BRACKET(BOARD) |
| 1V | SDSF2006Z | SCREW, X2 |
| 1W | PRD30828 | PLATE (SUB) |
| 1X | PRD30030-82 | PAD |
| 1Y | PRD30030-83 | PAD |
| 2 | PRD20401F | DOOR(U) ASSY |
| 2A | PRD30830-01-01 | BUTTON(1) |
| 2B | PRD30830-02-01 | BUTTON(1) |
| 2C | PRD30831-03-01 | BUTTON(2), X2 |
| 2D | PRD30831-04-01 | BUTTON(2) |
| 2E | PRD30844-02-01 | SHEET(DOOR) |
| 2F | PU59891-2 | MAGNET, X2 |
| 3 | PRD20403G | DOOR(L) ASSY |
| 4 | PRD30834-02 | BUTTON(3) |
| 5 | PQ32362-1-2 | SHAFT |
| 6 | PQ43470 | GEAR |
| 7 | PQ43467 | HOLDER |
| 8 | PQ43704-1-1 | SPRING |
| 9 | PU60527 | DAMPER UNIT |
| 10 | SPSF2008M | SCREW, X4 |
| 11 | SDSF2010Z | SCREW, X2 |
| 12 | SDSF2608Z | SCREW, X2 |
| 13 | SDSF2608Z | SCREW, X12 |
| 14 | PRD30701 | CASSETTE HOUSING DOOR |
| 15 | PQ42410-1-1 | TORSION SPRING |
| 16 | PRD10170-01-01 | TOP COVER |
| 17 | PRD30555 | PRESET DOOR |
| 18 | PQ10706-1-4 | BOTTOM COVER |
| 19 | PRD44050-03 | SCREW, X4 |
| 20 | SDSF3010R | SCREW |
| 21 | WBS3000N | WASHER, X2 |
| 22 | SDST3006R | SCREW |
| 23 | SDSF3008Z | SCREW, X7 |
| 24 | DPSP3006Z | SCREW |
| 25 | PQ43703A-1 | FOOT ASSY, X2 |
| 26 | SDSF3012Z | SCREW, X2 |
| 27 | PRD30030-78 | PAD |
| 28 | PRD43080D | PLATE ASSY |
| 28A | PRD44266 | PLATE |
| 28B | SDSP3008M | SCREW, X2 |
| 28C | PQM30017-23 | SLIT WASHER, X2 |
| 28D | PRD30026-39 | COLLAR, X2 |
| 29 | PRD43705 | BUTTON(RND), X2 |
| 31 | PRD20398-02 | TERMINAL 2 BOAD |
| 32 | SNB0007-118S | TERMINAL |
| 33 | SDSF3014M | SCREW, X2 |
| 38 | PRD30085-42-24 | RATING LABEL |
| 41 | PRD44328 | STICKER |
| 42 | SDST3006Z | SCREW |
| 43 | PRD43981 | PLATE |
| 44 | PRD30030-80 | PAD |
| 45 | PRD30030-79 | PAD, X10 |
| 46 | SDST2608Z | SCREW |
| 49 | PU49485-3 | WIRE CLAMP |
| 50 | PRD30030-137 | PAD(TOP COVER), X2 |
| 51 | PRD30030-136 | PAD(BATTERY) |

## - SA-K90E OPTIONAL -

| #⚠ REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| 31 | PRD20398 | TERMINAL 2 BOAD |
| 32 | SNB0007-118S | TERMINAL |
| 33 | SDSF3014M | SCREW, X2 |
| 34 | PGZ01205 | 25P CONNECTOR |
| 35 | PRD43707 | BRACKET(25P) |
| 36 | SDSF2606Z | SCREW, X2 |
| 37 | PGZ01821-02 | SCREW, X2 |
|  | or PGZ01735-02 | SCREW, X2 |
| 47 | WSS2600Z | WASHER, X4 |
| 48 | WLS2600Z | L.WASHER, X2 |
| 49 | NNS2600N | NUT, X2 |

### 5.2.3 Chassis assembly <M3>


MAIN BOARD ASSY <04>
REAR I BOARD ASSY <76>
CASSETTE HOUSING BOARD <56>
PRE/REC AMP BOARD ASSY <43>
REGULATOR BOARD ASSY <02>
REFER TO SEC.6 SWITCHING REGULATOR BOARD ASSY
SWITCHING POWER SUPPLY BOARD ASSY <01>
TIME LAPSE SERVO BOARD ASSY <06>
MAIN SUB BOARD ASSY <08>
MECHACON BOARD ASSY <07>
D/C SERVO BOARD ASSY <05>
VIDEO SUB BOARD ASSY <10>
MECHANISM ASSY <M4>
CHASSIS ASSY
TIMER BOARD ASSY <79>
ONSCREEN DATA/BATTERY BOARD (1) ASSY <74>
ONSCREEN DATA/BATTERY BOARD (2) ASSY <75>
(OPTIONAL SA-K90E) RS-232C BOARD ASSY <95>
MECHACON SUB BOARD ASSY <66>
F1
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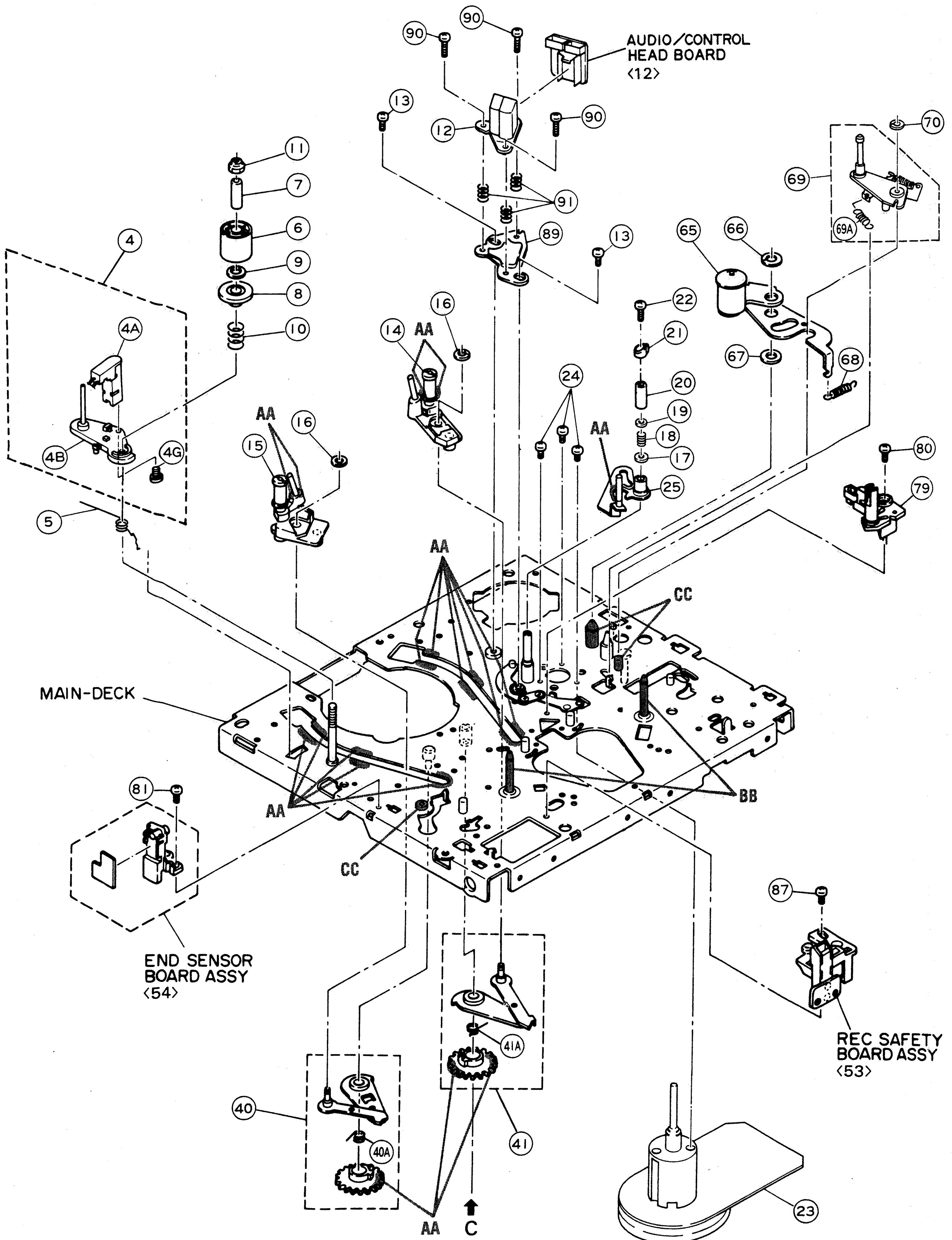
## CHASSIS ASSEMBLY <M3>

| #⚠ REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| 1 | PQ32783 | EARTH PLATE |
| 2 | PRD30894 | EARTH PLATE |
| 3 | PRD30893-02 | EARTH PLATE |
| 4 | PRD30893 | EARTH PLATE |
| 5 | PU49485 | WIRE CLAMP, X2 |
| 6 | SDSF3008Z | SCREW, X2 |
| 7 | SDST2605Z | SCREW |
| 8 | SDSP2608Z | SCREW, X2 |
| 9 | PQ43831-2 | SPECIAL SCREW, X3 |
| 10 | SDST2605Z | SCREW, X2 |
| 11 | SDST2605Z | SCREW, X2 |
| 12 | PQ43831-2 | SPECIAL SCREW, X3 |
| 13 | GPSF2610Z | SCREW, X2 |
| 14 | GPSF2610Z | SCREW |
| 15 | PQ44003 | SCREW, X2 |
| 16 | SDSF3010M | SCREW |
| 17 | SDSF3008Z | SCREW, X3 |
| ⚠ 18 | PQ32578 | COVER(AC) |
| 19 | PQ43714 | BRACKET(FE) |
| 20 | SDSF3008Z | SCREW |
| 22 | PGS20693B-04 | CASSETTE HOUSING ASSY |
| 22A | PQ42385A | MOTOR ASSY |
|  | or PQ42385B | MOTOR ASSY |
| 22B | DV710SR223M16 | VARISTOR |
| 22C | SPSP2603Z | SCREW, X2 |
| 22D | PQM30003-19 | BELT |
| 22E | SPSP2604Z | SCREW |
| 22F | SPST2605Z | SCREW, X2 |
| 23 | PRD42486A-02 | CLEANER ARM ASSY |
| 24 | PRD42664 | CLEANER HOLDER |
| 25 | Q03093-829 | WASHER |
| 26 | PQM30017 | SLIT WASHER |
| 27 | PRD40510-01-02 | CLEANER |
| 28 | PRD30024-42 | SPRING |
| 29 | PRD42487A-02 | CLEANER BASE ASSY |
| 30 | PQM30017 | SLIT WASHER |
| 31 | PU59401-2 | SOLENOID |
| 32 | PQM30002-187 | COMPRESSION SPRING |
| 33 | LPSP2003Z | SCREW |
| 36 | PRD30934 | PLATE |
| 37 | SDSF3008Z | SCREW |
| 38 | SDSF3008Z | SCREW, X2 |
| 39 | LDR2005A | DRUM ASSY |
| 39A | PDM2170E | UPPER DRUM ASSY |
| 39C | PDM4015B | BRUSH ASSY |
| 39D | LPSP2606Z | SCREW |
| 39E | PDM4165A | DRUM SCREW ASSY, X2 |
| 39F | PDM4039C | HEATER ASSY |
| 39G | SDBP2603N | SCREW |
| 39H | PDM3017 | UPPER DRUM BOARD |
| 41 | PRD43144A-02 | DRUM COVER ASSY |
| 42 | PRD43990 | SCREW |
| 43 | SDST2606Z | SCREW |
| 45 | PRD43094 | COLLAR |
| 46 | SDSF3008Z | SCREW |
| 47 | PRS40014 | SHIELD PLATE |
| 48 | SDSF3008Z | SCREW |
| 50 | PRS40016 | SHIELD PLATE |
| 51 | SDSF2608Z | SCREW |
| 54 | SBST3006Z | SCREW |
| 55 | SDST2605Z | SCREW, X2 |
| 57 | PQ32566-7 | PLATE |
| 58 | PRD30030-52 | PAD |
| 59 | PU49485-4 | WIRE CLAMP, X2 |
| 60 | SDSP2610Z | SCREW |
| 61 | SDSF3008Z | SCREW, X4 |
| 67 | PU49485-4 | WIRE CLAMP |
| 73 | SDSF3008Z | SCREW, X2 |
| 74 | WNS3000N | WASHER |

### 5.2.4 Machanism assembly < M4 >


AUDIO/CONTROL HEAD BOARD <12>
MAIN-DECK
END SENSOR BOARD ASSY <54>
REC SAFETY BOARD ASSY <53>
AA
BB
CC
C
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4A
4B
4G
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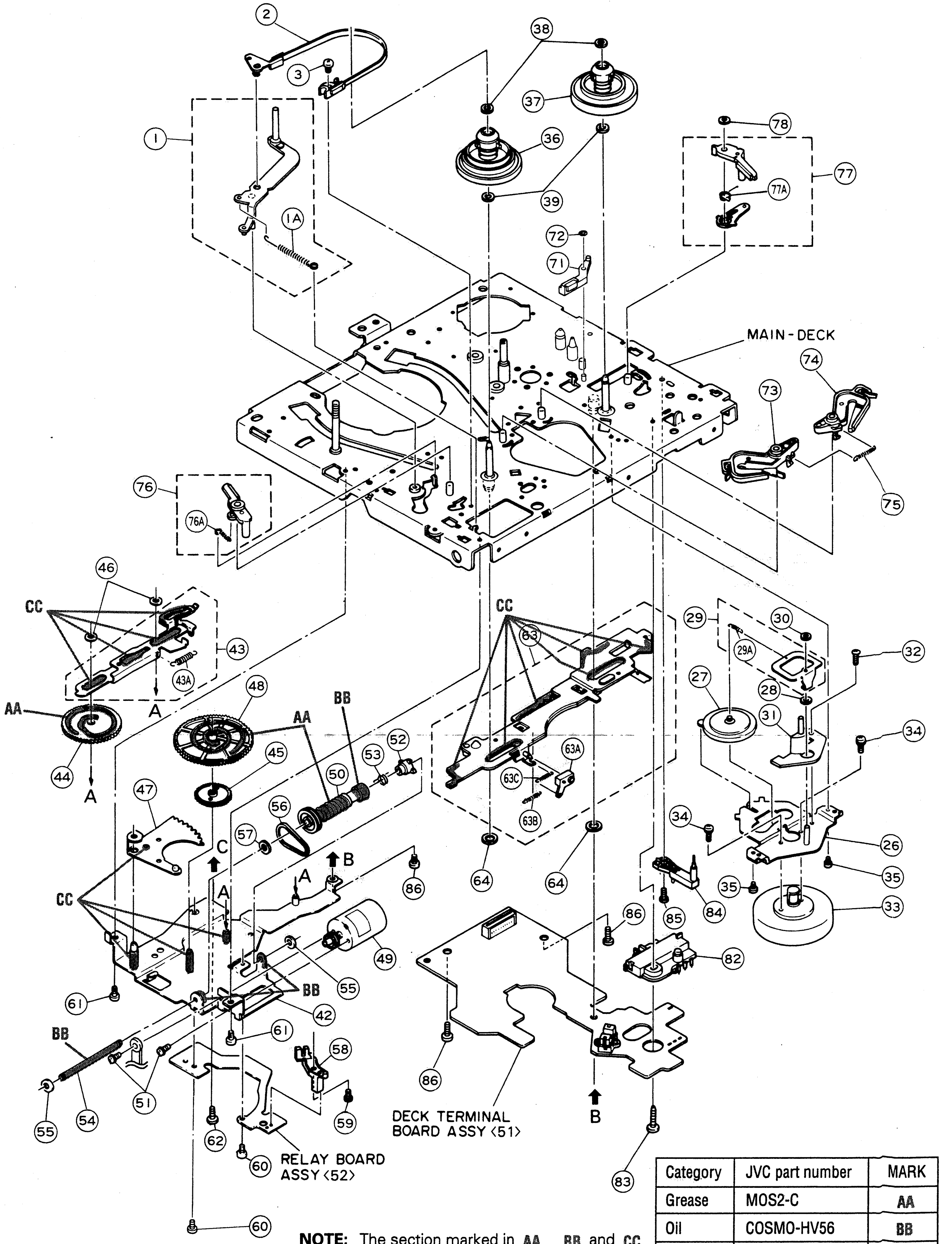
| Category | JVC part number | MARK |
|---|---|---|
| Grease | MOS2-C | AA |
| Oil | COSMO-HV56 | BB |
| Grease | XLA-2 | CC |

**NOTE:** The section marked in AA BB and CC indicate lubriction and gerasing areas.


MAIN-DECK
DECK TERMINAL BOARD ASSY <51>
RELAY BOARD ASSY <52>
AA
BB
CC
A
B
C
1
1A
2
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26
27
28
29
29A
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77A
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85
86

**NOTE:** The section marked in AA BB and CC indicate lubriction and gerasing areas.

| Category | JVC part number | MARK |
|---|---|---|
| Grease | MOS2-C | AA |
| Oil | COSMO-HV56 | BB |
| Grease | XLA-2 | CC |

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## MECHANISM ASSEMBLY <M4>

| #⚠ REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| 1 | PQ43710A | TENSION ARM ASSY |
| 1A | PQ41952-5 | SPRING |
| 2 | PRD43319A | TENSION BAND ASSY |
| 3 | SDST2606Z | SCREW |
| 4 | PQ41953A | FULL ERASE HEAD ASSY |
| 4A | PU57641-2 | FULL ERASE HEAD |
| 4B | PQ31036 | FULL ERASE HEAD BASE |
| 4G | SPSG2606Z | SCREW |
| 5 | PQ41954-1-1 | TORSION SP. |
| 6 | PQ41955 | IMPEDANCE ROLLER |
| 7 | PRD42512 | COLLAR |
| 8 | PQ41957 | LOWER FLANGE |
| 9 | PQM30018-39 | SPACER |
| 10 | PQM30002-124 | COMPRESSION SPRING |
| 11 | PQ40353 | NYLON NUT |
| 12 | PU60560-2 | AUDIO/CONTROL HEAD |
| 13 | PRD30027-04 | SCREW, X2 |
| 14 | PGZ01351 | POLE BASE ASSY(TAKE-UP) |
| 15 | PRD43905C | POLE BASE ASSY(SUPPLY) |
| 16 | PQM30017-5 | SLIT WASHER, X2 |
| 17 | WNS3000N | WASHER |
| 18 | PRD30023-30 | COMPRESSION SPRING |
| 19 | PRD42998-01-01 | GUIDE FLANGE |
| 20 | PU53629-3 | TAPE GUIDE |
| 21 | PRD42612 | G.POLE CAP |
| 22 | PRD43165 | SPECIAL SCREW |
| 23 | PGZ01300 | CAPSTAN MOTOR |
| 24 | SPSP2605N | SCREW, X3 |
| 25 | PRD43100A | HALF LOADING ARM ASSY |
| 26 | PQ41974A-3 | REEL MOTOR BRACKET ASSY |
| 27 | PU58645-1-4 | IDLER ARM |
| 28 | Q03093-834 | WASHER |
| 29 | PQ41976A-1 | SPRING ARM ASSY |
| 29A | PQ42212-1-4 | SPRING |
| 30 | PQM30017-22 | SLIT WASHER |
| 31 | PQ41978 | HOLDER |
| 32 | SPST2606Z | SCREW |
| 33 | PGZ01332-01-01 | REEL MOTOR |
| 34 | SDSP2603Z | SCREW, X2 |
| 35 | SPST2606Z | SCREW, X2 |
| 36 | PU59250-1-2 | REEL DISK (SUPPLY) |
| 37 | PU58638-1-2 | REEL DISK (TAKE-UP) |
| 38 | PQM30017-5 | SLIT WASHER, X2 |
| 39 | Q03093-828 | WASHER, X2 |
| 40 | PQ41979A-5 | LOADING ARM ASSY (SUPLLY) |
| 40A | PQ42677 | TORSION SPRING |
| 41 | PQ41985B-3 | LOADING ARM ASSY (TU) |
| 41A | PQ41990 | TORSION SPRING |
| 42 | PQ42973A | CAM BRACKET ASSY |
| 43 | PQ42974A | SLIDE CAM PLATE ASSY |
| 43A | PQM30001-224 | SPRING |
| 44 | PQ31677 | HALF LOADING CAM |
| 45 | PQ42963 | SECOND GEAR |
| 46 | PQM30017-24 | SLIT WASHER, X2 |
| 47 | PQ41994A-3 | ARM GEAR ASSY |
| 48 | PQ20428 | CONTROL CAM |
| 49 | PQ41996B | MODE MOTOR ASSY |
|  | or PQ41996C | MODE MOTOR ASSY |
| 50 | PQ41998A | WORM ASSY |
| 51 | LPSP2604Z | ASSY SCREW, X2 |
| 52 | PQ42001 | WINDMILL |
| 53 | PRD43278 | CLUTCH SPRING |
| 54 | PQ42003 | WORM SHAFT |
| 55 | PQM30017-5 | SLIT WASHER, X2 |
| 56 | PQM30003-20 | BELT |
| 57 | PQM30018-22 | SPACER |
| 58 | PU61088 | R.SENSOR(S) |
| 59 | LPSP2604Z | ASSY SCREW |
| 60 | SPST2606Z | SCREW, X2 |
| 61 | SPST2606Z | SCREW, X2 |
| 62 | LPSP2604Z | ASSY SCREW |
| 63 | PQ42038E | PLATE ASSY |
| 63A | PQ31044-1-2 | LOCK LEVER |
| 63B | PQM30001-223 | TENSION SPRING |
| 63C | PQM30001-211 | TENSION SPRING |
| 64 | PQM30017-28 | SLIT WASHER, X2 |
| 65 | PQ42006B-5 | PINCH ROLLER ARM ASSY |
| 66 | PQM30017-28 | SLIT WASHER |
| 67 | Q03093-833 | WASHER |
| 68 | PQM30001-229 | TENSION SPRING |
| 69 | PQ32676A | GUIDE ARM ASS' Y |
| 69A | PQ42029 | SPRING |
| 70 | PQM30017-6 | SLIT WASHER |
| 71 | PQ43778A | REVERSE BRAKE ASSY |
| 72 | PQM30017-22 | SLIT WASHER |
| 73 | PQ42019B-6 | MAIN BRAKE ASSY (SUPPLY) |
| 74 | PQ42020B | MAIN BRAKE AY (TAKE-UP) |
| 75 | PQM30001-216 | TENSION SPRING |
| 76 | PQ42021A-3 | SUB BRAKE ASSY (SUPPLY) |
| 76A | PQ42023-1-2 | TENSION SPRING |
| 77 | PQ42037A-2 | SUB BRAKE ASSY (TAKE-UP) |
| 77A | PQ42028-1-1 | TORSION SPRING |
| 78 | PQM30017-6 | SLIT WASHER |
| 79 | PU59925-1-1 | LED HOLDER, INCL.LED |
| 80 | SPST2606Z | SCREW |
| 81 | SPST2606Z | SCREW |
| 82 | PU59924 | SLIDE ENCORDER |
| 83 | SDSP2610Z | SCREW |
| 84 | PU59919-1-1 | CASSETTE SWITCH |
| 85 | SDST2608Z | SCREW |
| 86 | SDSP2606Z | SCREW, X3 |
| 87 | SDST2606Z | SCREW |
| 89 | PQ42984-2 | HEAD BASE |
| 90 | PQ43687A | SCREW, X3 |
| 91 | PU30080-49 | SPRING, X3 |

# SECTION 6
# ELECTRICAL PARTS LIST

**SAFETY PRECAUTION**
**Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.**

**NOTES:**
- [M ] indicates mechanical symbol number.
- [2 digits] indicates circuit board symbol number.
- "X " indicates quantity per set.

## SW.REG BOARD ASSY <01>

| #⚠ | REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|---|
| | PWBA | PGE10151E | SWTCHING REGULATOR ASSY | |
| ⚠ | CV1 | PU52931 | CONNECTOR COVER | |
| | STK1 | PU45972-16 | STICKER | |
| | STK2 | PU44457 | STICKER | |
| ⚠ | AO1 | PGZ00760 | AC INLET | |
| | BKT1 | PRD20225 | TRANS BRACKET | |
| | BKT2 | PRD44023-02 | EARTH BRACKET | |
| | HS1 | PQ43230 | HEAT SINK(2) | |
| | SCW1 | DPSP4008Z | ASSY SCREW | |
| | SCW2 | DPSP3008Z | ASSY SCREW, ×2 | |
| | SCW3 | DPSP3012Z | SCREW, ×2 | |
| | SCW4 | SDST3006Z | SCREW, ×3 | |
| | SCW5 | SBSB3008Z | SCREW, ×4 | |
| | SCW6 | SBSB3006Z | SCREW | |
| | SCW7 | LPSP4008Z | SCREW | |
| | SLD1 | PQ32071 | SHILD CASE(2) | |
| ⚠ | SPC1 | PQ43773 | SHEET(AC) | |
| ⚠ | F1 | QMF51E2-1R25 | FUSE | 1.25A |

## - SW.POWER SUPPLY BOARD ASSY<01> -

| #⚠ | REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|---|
| | PWBA | PGE10151C1 | SWTCHING BOARD ASSY | |
| | STK1 | PRD30072-87 | STICKER | |
| | IC1 | STR-D1706 | IC | |
| | D1 | 10E6-F2 | DIODE | |
| | D2 | 10E6-F2 | DIODE | |
| | D3 | 10E6-F2 | DIODE | |
| | D4 | 10E6-F2 | DIODE | |
| | D5 | RU1A | FR DIODE | |
| | D6 | RU1A | FR DIODE | |
| | D7 | AU01Z | FR DIODE | |
| | | or ERA48-02 | FR DIODE | |
| | D8 | AU01Z | FR DIODE | |
| | | or ERA48-02 | FR DIODE | |
| | D9 | AU01Z | FR DIODE | |
| | D10 | AU01Z | FR DIODE | |
| | D11 | FML-12S | FR DIODE | |
| | D12 | F5KQ40B | BARRIER DIODE | |
| | | or FMB-24 | BARRIER DIODE | |
| | D13 | AU01Z | FR DIODE | |
| | | or ERA48-02 | FR DIODE | |
| | D14 | AU01Z | FR DIODE | |
| | | or ERA48-02 | FR DIODE | |
| | D28 | AU01Z | FR DIODE | |
| | R1 | QRZ0078-2R2 | W.W.RESISTOR | 2.2Ω |
| | R2 | QRD181J-334 | RESISTOR | 330kΩ,1/8W |
| | R3 | QRD181J-334 | RESISTOR | 330kΩ,1/8W |
| | R4 | QRG029J-104 | OMF RESISTOR | 100kΩ,2W |
| | R5 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| | R6 | QRG029J-201 | OMF RESISTOR | 200Ω,2W |
| | R7 | QRZ0078-R39 | WW RESISTOR | 0.39Ω |
| | R9 | QVZ3507-101 | V RESISTOR | 100Ω |
| ⚠ | C1 | QFZ9022-683 | MM CAPACITOR | 0.068μF |
| | C7 | QCZ9016-222M | CAPACITOR | 0.0022μF |
| | | or QCZ9048-222 | CAPACITOR | 0.0022μF |
| | C8 | QCZ9016-222M | CAPACITOR | 0.0022μF |
| | | or QCZ9048-222 | CAPACITOR | 0.0022μF |
| | C9 | QED61HM-226 | E CAPACITOR | 22μF,50V |
| | C10 | PGZ02037 | E CAPACITOR | 100μF,400V |
| | C11 | QCY53AK-472 | CAPACITOR | 0.0047μF,1000V |
| | C12 | QCY43AK-121 | CAPACITOR | 120pF,1000V |
| | C13 | QFLA1HJ-222Z | M CAPACITOR | 0.0022μF,50V |
| | C14 | QFV41HJ-474 | TF CAPACITOR | 0.47μF,50V |
| | C15 | QEZ0108-187Z | E CAPACITOR | 180μF |
| ⚠ | C17 | QCZ9016-102K | CAPACITOR | 0.001μF |
| ⚠ | | or QCZ9047-102 | CAPACITOR | 0.001μF |
| ⚠ | C18 | QCZ9016-102K | CAPACITOR | 0.001μF |
| ⚠ | | or QCZ9047-102 | CAPACITOR | 0.001μF |
| | C31 | QEZ0125-228 | E CAPACITOR | 2200μF |
| | C32 | QEZ0106-338 | E CAPACITOR | 3300μF |
| | C33 | QEZ0104-476Z | E CAPACITOR | 47μF |
| | C34 | QEZ0107-476Z | E CAPACITOR | 47μF |
| | C35 | QETB1EM-108 | E CAPACITOR | 1000μF,25V |
| | C36 | QETB1EM-108 | E CAPACITOR | 1000μF,25V |
| | C37 | QETB1AM-108 | E CAPACITOR | 1000μF,10V |
| | C38 | QETC1JM-226 | E CAPACITOR | 22μF,63V |
| | C39 | QETC1HM-226 | E CAPACITOR | 22μF,50V |
| | C40 | QFLA1HJ-102Z | M CAPACITOR | 0.001μF,50V |
| | C41 | QFLA1HJ-102Z | M CAPACITOR | 0.001μF,50V |
| | C42 | QFLA1HJ-472Z | M CAPACITOR | 0.0047μF,50V |

| #⚠ | REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|---|
| | L11 | PU56183-330 | COIL | 33 μH |
| | L12 | PU56183-330 | COIL | 33 μH |
| | L13 | PU56183-330 | COIL | 33 μH |
| | L14 | PU48530-101K | COIL | 100 μH |
| | L15 | PU48530-101K | COIL | 100 μH |
| | L16 | PU48530-8R2K | COIL | 8.2 μH |
| | L17 | PU48530-8R2K | COIL | 8.2 μH |
| ⚠ | T1 | PU60683-2 | SWITCHING TRANSFORMER | |
| | HS1 | PQ43231-1-1 | HEAT SINK(3) | |
| | HS2 | PU60798 | HEAT SINK | |
| ⚠ | LF2 | PU60347 | LINE FILTER | |
| | SLD1 | PQ32558-1-1 | SHIELD CASE(1) | |
| | CN1 | PU58844-9 | CONNECTOR | |
| | CN2 | PU58844-3 | CONNECTOR | |

## - REGULATOR BOARD ASSY<02> -

| #⚠ | REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|---|
| | PWBA | PGE10151E2 | REGULATOR BOARD ASSY | |
| | IC2 | BA10324 | IC | |
| | IC3 | UPC2405HF | IC | |
| | IC101 | M54647L | IC | |
| | Q11 | 2SD1764 | TRANSISTOR | |
| | | or 2SD1796 | TRANSISTOR | |
| | Q12 | 2SC1740S(QRS) | TRANSISTOR | |
| | Q13 | 2SD1764 | TRANSISTOR | |
| | | or 2SD1796 | TRANSISTOR | |
| | Q14 | 2SD1764 | TRANSISTOR | |
| | | or 2SD1796 | TRANSISTOR | |
| | Q15 | 2SD1764 | TRANSISTOR | |
| | | or 2SD1796 | TRANSISTOR | |
| | Q16 | 2SB1186(DE) | TRANSISTOR | |
| | Q17 | 2SA720 | TRANSISTOR | |
| | Q18 | DTA114ES | TRANSISTOR | |
| | D16 | RD6.2ES-T1B3 | ZENER DIODE | |
| | D17 | RD5.1ES-T1B2 | ZENER DIODE | |
| | D19 | HZ6B1TE | DIODE | |
| | | or HZ6B1TJ | DIODE | |
| | D20 | RD13ES-T1B3 | DIODE | |
| | D21 | HZS33EB1 | ZENER DIODE | |
| | D23 | 1SS133 | DIODE | |
| | | or MA165 | DIODE | |
| | D24 | 1SS133 | DIODE | |
| | | or MA165 | DIODE | |
| | D25 | 1SS133 | DIODE | |
| | | or MA165 | DIODE | |
| | D26 | 1SS133 | DIODE | |
| | | or MA165 | DIODE | |
| | D27 | RD20ES-T1B2 | ZENER DIODE | |
| | | or MTZ20BT-77 | ZENER DIODE | |
| | R14 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| | R15 | QRD161J-362 | RESISTOR | 3.6kΩ,1/6W |
| | R16 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| | R17 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| | R18 | QRD161J-622 | RESISTOR | 6.2kΩ,1/6W |
| | R19 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| | R20 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| | R21 | QRD161J-153 | RESISTOR | 15kΩ,1/6W |
| | R22 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| | R23 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| | R24 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| | R25 | QRD161J-153 | RESISTOR | 15kΩ,1/6W |
| | R26 | QVZ3521-222 | V RESISTOR | 2.2kΩ |
| | R27 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| | R28 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| | R29 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| | R30 | QRD161J-392 | RESISTOR | 3.9kΩ,1/6W |
| | R31 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| | R32 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| | R33 | QRD161J-331 | RESISTOR | 330Ω,1/6W |
| | R34 | QRD161J-272 | RESISTOR | 2.7kΩ,1/6W |
| | R35 | QRZ0077-220X | FUSIBLE RESISTOR | 22Ω |
| | R36 | QRZ0077-220X | FUSIBLE RESISTOR | 22Ω |
| | R43 | QRD161J-392 | RESISTOR | 3.9kΩ,1/6W |
| | R44 | QRD181J-1R0 | RESISTOR | 1Ω,1/8W |
| | R45 | QRD181J-1R0 | RESISTOR | 1Ω,1/8W |
| | R46 | QRD181J-1R0 | RESISTOR | 1Ω,1/8W |
| | R47 | QRD181J-1R0 | RESISTOR | 1Ω,1/8W |
| | R48 | QRD181J-1R0 | RESISTOR | 1Ω,1/8W |
| | R49 | QRD181J-1R0 | RESISTOR | 1Ω,1/8W |
| | R50 | QRD181J-1R0 | RESISTOR | 1Ω,1/8W |
| | R51 | QRD181J-1R0 | RESISTOR | 1Ω,1/8W |
| | R52 | QRD181J-562 | RESISTOR | 5.6kΩ,1/8W |
| | R53 | QRD181J-562 | RESISTOR | 5.6kΩ,1/8W |
| | C43 | QFN31HJ-103 | M CAPACITOR | 0.01 μF,50V |
| | C44 | QETC1CM-107 | E CAPACITOR | 100 μF,16V |
| | C45 | QETC1HM-106 | E CAPACITOR | 10 μF,50V |
| | C46 | QFN31HJ-103 | M CAPACITOR | 0.01 μF,50V |
| | C47 | QFN31HJ-103 | M CAPACITOR | 0.01 μF,50V |
| | C48 | QETC1CM-107 | E CAPACITOR | 100 μF,16V |
| | C49 | QFN31HJ-103 | M CAPACITOR | 0.01 μF,50V |
| | C50 | QFN31HJ-103 | M CAPACITOR | 0.01 μF,50V |
| | C51 | QETC1AM-107 | E CAPACITOR | 100 μF,10V |
| | C52 | QEZ0107-476Z | E CAPACITOR | 47 μF |
| | C53 | QETC1CM-107 | E CAPACITOR | 100 μF,16V |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| C82 | QETC1HM-225 | E CAPACITOR | 2.2μF,50V |
| C83 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C84 | QCS31HJ-820 | CAPACITOR | 82pF,50V |
| C85 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C86 | QER61EM-475 | E CAPACITOR | 4.7μF,25V |
| C87 | QER61EM-475 | E CAPACITOR | 4.7μF,25V |
| C88 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C89 | QER61CM-106 | E CAPACITOR | 10μF,16V |
| C90 | QER60JM-107 | E CAPACITOR | 100μF,6.3V |
| C91 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C93 | QER61HM-225 | E CAPACITOR | 2.2μF,50V |
| C94 | QCT25CH-390 | CAPACITOR | 39pF |
| C95 | QER61HM-105 | E CAPACITOR | 1μF,50V |
| C96 | QFP31HG-221 | PP CAPACITOR | 220pF,50V |
| C97 | QER61EM-475 | E CAPACITOR | 4.7μF,25V |
| C98 | QFN31HJ-223 | M CAPACITOR | 0.022μF,50V |
| C99 | QCS31HJ-150 | CAPACITOR | 15pF,50V |
| C100 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C101 | QFN31HJ-223 | M CAPACITOR | 0.022μF,50V |
| C102 | QER61HM-105 | E CAPACITOR | 1μF,50V |
| C104 | QCFB1EZ-223 | CAPACITOR | 0.022μF,25V |
| C105 | QCS31HJ-390 | CAPACITOR | 39pF,50V |
| C106 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C107 | QCF31HP-223 | CAPACITOR | 0.022μF,50V |
| C108 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C112 | QER61EM-335 | E CAPACITOR | 3.3μF,25V |
| C113 | QFN31HJ-473 | M CAPACITOR | 0.047μF,50V |
| C114 | QER61EM-475 | E CAPACITOR | 4.7μF,25V |
| C115 | QER61HM-104 | E CAPACITOR | 0.1μF,50V |
| C116 | QER61EM-475 | E CAPACITOR | 4.7μF,25V |
| C119 | QFN31HJ-333 | M CAPACITOR | 0.033μF,50V |
| C120 | QETC1HM-104 | E CAPACITOR | 0.1μF,50V |
| C121 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C122 | QCS31HJ-680 | CAPACITOR | 68pF,50V |
| C123 | QETC1HM-104 | E CAPACITOR | 0.1μF,50V |
| C124 | QFN31HJ-473 | M CAPACITOR | 0.047μF,50V |
| C125 | QETC1EM-475 | E CAPACITOR | 4.7μF,25V |
| C126 | QETC1HM-105 | E CAPACITOR | 1μF,50V |
| C127 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C128 | QETC0JM-107 | E CAPACITOR | 100μF,6.3V |
| C129 | QETC1HM-104 | E CAPACITOR | 0.1μF,50V |
| C130 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C131 | QETC1CM-336 | E CAPACITOR | 33μF,16V |
| C132 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C135 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C136 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C137 | QER61CM-336 | E CAPACITOR | 33μF,16V |
| C139 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C140 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C141 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C142 | QER61CM-336 | E CAPACITOR | 33μF,16V |
| C143 | QCF31HP-223 | CAPACITOR | 0.022μF,50V |
| C146 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C147 | QCF31HP-223 | CAPACITOR | 0.022μF,50V |
| C148 | QFN31HJ-563 | M CAPACITOR | 0.056μF,50V |
| C149 | QETC1HM-104 | E CAPACITOR | 0.1μF,50V |
| C150 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| C151 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C152 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C153 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C154 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C155 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C156 | PU57672-400 | TRIMMER CAPACITOR | 40pF |
| C157 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C158 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C159 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C160 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C161 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C162 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C163 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C164 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C165 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C166 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C167 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C168 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C169 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C170 | QCS31HJ-101 | CAPACITOR | 100pF,50V |
| C171 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C172 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C173 | QETC1CM-336 | E CAPACITOR | 33μF,16V |
| C174 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C175 | QETC1HM-105 | E CAPACITOR | 1μF,50V |
| C176 | QETC1HM-105 | E CAPACITOR | 1μF,50V |
| C177 | QETC1EM-475 | E CAPACITOR | 4.7μF,25V |
| C178 | QETC1HM-105 | E CAPACITOR | 1μF,50V |
| C179 | QETC1HM-105 | E CAPACITOR | 1μF,50V |
| C180 | QETC0JM-107 | E CAPACITOR | 100μF,6.3V |
| C181 | QFN31HJ-222 | M CAPACITOR | 0.0022μF,50V |
| C182 | QCC31CJ-332 | CAPACITOR | 0.0033μF,16V |
| C183 | QCC31CJ-152 | CAPACITOR | 0.0015μF,16V |
| C184 | QCC31CJ-222 | CAPACITOR | 0.0022μF,16V |
| C185 | QCC31CJ-103 | CAPACITOR | 0.01μF,16V |
| C186 | QCC31CJ-273 | CAPACITOR | 0.027μF,16V |
| C187 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C188 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C189 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C190 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C191 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C192 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C193 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C194 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C196 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C197 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C198 | QCS31HJ-240 | CAPACITOR | 24pF,50V |
| C199 | QETC0JM-107 | E CAPACITOR | 100μF,6.3V |
| C200 | QETC1HM-104 | E CAPACITOR | 0.1μF,50V |
| C201 | QETC1HM-104 | E CAPACITOR | 0.1μF,50V |
| C202 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C203 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C205 | QER60JM-107 | E CAPACITOR | 100μF,6.3V |
| C206 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C207 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C208 | QER61CM-476 | E CAPACITOR | 47μF,16V |
| C209 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| C210 | QER60JM-476 | E CAPACITOR | 47 μ F,6.3V |
| C211 | QCF31HP-103 | CAPACITOR | 0.01 μ F,50V |
| C212 | QER61EM-475 | E CAPACITOR | 4.7 μ F,25V |
| C213 | QER61HM-105 | E CAPACITOR | 1 μ F,50V |
| C214 | QCF31HP-103 | CAPACITOR | 0.01 μ F,50V |
| C215 | QCF31HP-103 | CAPACITOR | 0.01 μ F,50V |
| C216 | QCS31HJ-180 | CAPACITOR | 18pF,50V |
| C217 | QCS31HJ-100 | CAPACITOR | 10pF,50V |
| C218 | QCF31HP-103 | CAPACITOR | 0.01 μ F,50V |
| C219 | QCF31HP-223 | CAPACITOR | 0.022 μ F,50V |
| C220 | QETC1CM-476 | E CAPACITOR | 47 μ F,16V |
| C221 | QETC1CM-476 | E CAPACITOR | 47 μ F,16V |
| C222 | QER61HM-105 | E CAPACITOR | 1 μ F,50V |
| C223 | QETC0JM-107 | E CAPACITOR | 100 μ F,6.3V |
| C224 | QER60JM-107 | E CAPACITOR | 100 μ F,6.3V |
| C225 | QCS31HJ-470 | CAPACITOR | 47pF,50V |
| C226 | QCS31HJ-181 | CAPACITOR | 180pF,50V |
| C227 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C228 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C229 | QCS31HJ-270 | CAPACITOR | 27pF,50V |
| C230 | QFN31HJ-103 | M CAPACITOR | 0.01 μ F,50V |
| C232 | QCS31HJ-3R0 | CAPACITOR | 3pF,50V |
| C233 | QCS31HJ-330 | CAPACITOR | 33pF,50V |
| C234 | QCS31HJ-270 | CAPACITOR | 27pF,50V |
| C235 | QCS31HJ-330 | CAPACITOR | 33pF,50V |
| C236 | QCS31HJ-270 | CAPACITOR | 27pF,50V |
| C238 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C239 | QCS31HJ-101 | CAPACITOR | 100pF,50V |
| C240 | QCS31HJ-390 | CAPACITOR | 39pF,50V |
| C242 | QCF31HP-103 | CAPACITOR | 0.01 μ F,50V |
| C243 | QCS31HJ-271 | CAPACITOR | 270pF,50V |
| C245 | QCS31HJ-150 | CAPACITOR | 15pF,50V |
| C246 | QER61HM-474 | E CAPACITOR | 0.47 μ F,50V |
| C248 | QETC1CM-107 | E CAPACITOR | 100 μ F,16V |
| C249 | QCF11HP-223 | CAPACITOR | 0.022 μ F,50V |
| C250 | QCF11HP-223 | CAPACITOR | 0.022 μ F,50V |
| C251 | QCF11HP-223 | CAPACITOR | 0.022 μ F,50V |
| C252 | QCF11HP-223 | CAPACITOR | 0.022 μ F,50V |
| C253 | QCF11HP-223 | CAPACITOR | 0.022 μ F,50V |
| C254 | QCF11HP-223 | CAPACITOR | 0.022 μ F,50V |
| C255 | QCS11HJ-470 | CAPACITOR | 47pF,50V |
| C256 | QCS11HJ-820 | CAPACITOR | 82pF,50V |
| C257 | QCF11HP-102 | CAPACITOR | 0.001 μ F,50V |
| C258 | QFN41HJ-103 | M CAPACITOR | 0.01 μ F,50V |
| L1 | PU48530-101J | COIL | 100 μ H |
| L2 | PU48530-101J | COIL | 100 μ H |
| L3 | PU48530-101J | COIL | 100 μ H |
| L4 | PU48530-680J | COIL | 68 μ H |
| L5 | PU48530-101J | COIL | 100 μ H |
| L6 | PU48530-820J | COIL | 82 μ H |
| L7 | PU48530-121J | COIL | 120 μ H |
| L8 | PU48530-471J | COIL | 470 μ H |
| L9 | PU48530-101J | COIL | 100 μ H |
| L13 | PU48530-560J | COIL | 56 μ H |
| L14 | PU48530-8R2K | COIL | 8.2 μ H |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| L18 | PU48530-560J | COIL | 56 μ H |
| L19 | PU48530-8R2K | COIL | 8.2 μ H |
| L21 | PU48530-101J | COIL | 100 μ H |
| L22 | PU48530-101J | COIL | 100 μ H |
| L24 | PU48530-150J | COIL | 15 μ H |
| L26 | PU48530-101J | COIL | 100 μ H |
| L27 | PU48530-101J | COIL | 100 μ H |
| L28 | PU48530-101J | COIL | 100 μ H |
| L29 | PU48530-101J | COIL | 100 μ H |
| L30 | PU48530-101J | COIL | 100 μ H |
| L31 | PU48530-101J | COIL | 100 μ H |
| L32 | PU48530-101J | COIL | 100 μ H |
| L33 | PU48530-120J | COIL | 12 μ H |
| L34 | PU48530-101J | COIL | 100 μ H |
| L35 | PU48530-1R0J | COIL | 1 μ H |
| L36 | PU48530-1R0J | COIL | 1 μ H |
| L37 | PU48530-5R6J | COIL | 5.6 μ H |
| L38 | PU48530-101J | COIL | 100 μ H |
| L39 | PU48530-330J | COIL | 33 μ H |
| L41 | PU57139 | LC BLOCK | |
| | or PU57139-2 | LC BLOCK | |
| L42 | PU48530-560J | COIL | 56 μ H |
| L43 | PU48530-560J | COIL | 56 μ H |
| L44 | PU48530-180J | COIL | 18 μ H |
| L45 | PU48530-390J | COIL | 39 μ H |
| L46 | PU48530-150J | COIL | 15 μ H |
| L47 | PU48530-150J | COIL | 15 μ H |
| L48 | PU48530-220J | COIL | 22 μ H |
| L49 | PU48530-220J | COIL | 22 μ H |
| L50 | PU48530-470J | COIL | 47 μ H |
| L51 | PU30284-65 | COIL | 15mH |
| L52 | PU48530-100J | COIL | 10 μ H |
| L53 | PU48530-680J | COIL | 68 μ H |
| EQ1 | PU53501-4 | EQUALIZER | |
| LPF1 | PELN0478 | LOW PASS FILTER | |
| LPF2 | PGZ00183 | LOW PASS FILTER | |
| LPF3 | PU60806-2 | LOW PASS FILTER | |
| LPF6 | PU58022 | LOW PASS FILTER | |
| ⚠ CF1 | PU57073 | CERAMIC FILTER | |
| DL1 | PU58971-3 | COMB FILTER | |
| DL2 | PU61081 | 1/4H DELAY LINE | |
| X1 | PEVB0386 | CRYSTAL RESONATOR | |
| K1 | PU60281-2Z | FERRATE BEADS | |
| K2 | PU60281-2Z | FERRATE BEADS | |
| K3 | PU60281-2Z | FERRATE BEADS | |
| K4 | PU60281-2Z | FERRATE BEADS | |
| K5 | PU60281-2Z | FERRATE BEADS | |

| #△REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| R40 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R41 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R42 | QRSA08J-123YN | RESISTOR | 12kΩ,1/10W |
| R43 | QRSA08J-274YN | RESISTOR | 270kΩ,1/10W |
| R44 | QRSA08J-105YN | RESISTOR | 1MΩ,1/10W |
| R45 | QRSA08J-105YN | RESISTOR | 1MΩ,1/10W |
| R46 | QRSA08J-273YN | RESISTOR | 27kΩ,1/10W |
| R47 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1/10W |
| R48 | QRSA08J-563YN | RESISTOR | 56kΩ,1/10W |
| R49 | QRSA08J-105YN | RESISTOR | 1MΩ,1/10W |
| R50 | QRSA08J-273YN | RESISTOR | 27kΩ,1/10W |
| R51 | QRSA08J-154YN | RESISTOR | 150kΩ,1/10W |
| R52 | QRSA08J-154YN | RESISTOR | 150kΩ,1/10W |
| R54 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R55 | QVZ3521-684 | V RESISTOR | 680kΩ |
| R56 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R57 | QRSA08J-154YN | RESISTOR | 150kΩ,1/10W |
| R58 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1/10W |
| R59 | QVZ3521-474 | V RESISTOR | 470kΩ |
| R60 | QVZ3521-474 | V RESISTOR | 470kΩ |
| R61 | QVZ3521-474 | V RESISTOR | 470kΩ |
| R62 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R63 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R64 | QRSA08J-155YN | RESISTOR | 1.5MΩ,1/10W |
| R66 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R67 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R68 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R69 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R70 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R71 | QRSA08J-332YN | RESISTOR | 3.3kΩ,1/10W |
| R72 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R73 | QRSA08J-182YN | RESISTOR | 1.8kΩ,1/10W |
| R74 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R75 | QRSA08J-0R0Y | RESISTOR | 0Ω,1/10W |
| R76 | QRSA08J-0R0Y | RESISTOR | 0Ω,1/10W |
| R77 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R78 | QRD167J-332 | RESISTOR | 3.3kΩ,1/6W |
| B120 | QRD161J-562 | RESISTOR | 5.6kΩ,1/6W |
| C1 | QFV71HJ-224 | TF CAPACITOR | 0.22μF,50V |
| C2 | QFV71HJ-563 | TF CAPACITOR | 0.056μF,50V |
| C3 | QFV71HJ-124 | TF CAPACITOR | 0.12μF,50V |
| C4 | QFV71HJ-104 | TF CAPACITOR | 0.1μF,50V |
| C5 | QFV71HJ-393 | TF CAPACITOR | 0.039μF,50V |
| C6 | QEK61CM-226 | E CAPACITOR | 22μF,16V |
| C7 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| C8 | QEK61CM-226 | E CAPACITOR | 22μF,16V |
| C9 | QCC11CK-102 | CAPACITOR | 0.001μF,16V |
| C10 | QCTA1CH-101 | CAPACITOR | 100pF |
| C11 | QCBB1HJ-101 | CAPACITOR | 100pF,50V |
| C14 | QFV71HJ-474 | TF CAPACITOR | 0.47μF,50V |
| C16 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| C17 | QCYA1HK-103 | CAPACITOR | 0.01μF,50V |
| C18 | QEK61CM-226 | E CAPACITOR | 22μF,16V |
| C19 | QFV71HJ-334 | TF CAPACITOR | 0.33μF,50V |

| #△REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| C20 | QFLC1HJ-682Z | M CAPACITOR | 0.0068μF,50V |
| C21 | QEK61EM-475 | E CAPACITOR | 4.7μF,25V |
| C22 | QEK61EM-475 | E CAPACITOR | 4.7μF,25V |
| C23 | QEK61CM-106 | E CAPACITOR | 10μF,16V |
| C24 | QEK61CM-106 | E CAPACITOR | 10μF,16V |
| C25 | QENC1HM-105 | NP E CAPACITOR | 1μF,50V |
| C26 | QFV71HJ-104 | TF CAPACITOR | 0.1μF,50V |
| C27 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| C28 | QCTA1CH-471 | CAPACITOR | 470pF |
| C29 | QFLC1HJ-682Z | M CAPACITOR | 0.0068μF,50V |
| C30 | QFLC1HJ-102Z | M CAPACITOR | 0.001μF,50V |
| C31 | QFV71HJ-124 | TF CAPACITOR | 0.12μF,50V |
| C33 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| C34 | QEK61AM-226 | E CAPACITOR | 22μF,10V |
| C35 | QCTA1CH-101 | CAPACITOR | 100pF |
| C36 | QEK61AM-226 | E CAPACITOR | 22μF,10V |
| C37 | QCTA1CH-5R0 | CAPACITOR | 5pF |
| C38 | QEK61HM-105 | E CAPACITOR | 1μF,50V |
| C39 | QEK61HM-105 | E CAPACITOR | 1μF,50V |
| C40 | QCYA1HK-103 | CAPACITOR | 0.01μF,50V |
| C41 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| C42 | QEK61CM-226 | E CAPACITOR | 22μF,16V |
| C43 | QCTA1CH-101 | CAPACITOR | 100pF |
| C44 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| C46 | QFV71HJ-394 | TF CAPACITOR | 0.39μF,50V |
| L1 | PU48530-101K | COIL | 100μH |
| L2 | PU48530-101K | COIL | 100μH |
| L3 | PU48530-100K | COIL | 10μH |
| TH1 | NTH5D223KA<br>or NTH5D223LA | THERMISTOR<br>THERMISTOR | |
| TP1 | PU56008 | TEST-PIN, ×9 | |
| CN1 | PU58844-3 | CONNECTOR | |
| CN2 | PU58931-16 | CONNECTOR | |
| CN3 | PU58844-5 | CONNECTOR | |
| CN4 | PU59555-7 | CONNECTOR | |
| CN5 | PU58844-7 | CONNECTOR | |
| CN6 | PU58844-5Y | CONNECTOR | |
| CN7 | PU58931-20 | CONNECTOR | |

## TL SERVO BOARD ASSY <06>

| | | | |
|---|---|---|---|
| PWBA | PRK10103A | TIMELAPSE SERVO BOARD ASSY | |
| IC1 | NJM2904M | IC | |
| IC2 | NJM2904M | IC | |
| IC3 | NJM2903M | IC | |

| #△REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| C616 | QETC1CM-106 | E CAPACITOR | 10μF,16V |
| C617 | QFV11HJ-273AZ | TF CAPACITOR | 0.027μF,50V |
| C618 | QFV11HJ-153AZ | TF CAPACITOR | 0.015μF,50V |
| C619 | QCBB1HJ-331 | CAPACITOR | 330pF,50V |
| C620 | QFV11HJ-683AZ | TF CAPACITOR | 0.068μF,50V |
| C621 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C622 | QCXB1CN-122 | CAPACITOR | 0.0012μF,16V |
| C623 | QCC31EJ-472 | CAPACITOR | 0.0047μF,25V |
| C624 | QCC31EK-272 | CAPACITOR | 0.0027μF,25V |
| C625 | QETC1CM-106 | E CAPACITOR | 10μF,16V |
| C626 | QFP32AF-682M | PP CAPACITOR | 0.0068μF,100V |
| C627 | QFN31HJ-222 | M CAPACITOR | 0.0022μF,50V |
| C628 | QETC1CM-107 | E CAPACITOR | 100μF,16V |
| L601 | PU58308-103J | COIL | 10mH |
| K603 | PU60281-2Z | FERRATE BEADS | |
| K604 | PU60281-2Z | FERRATE BEADS | |
| T601 | PU59949 | OSC TRANSFORMER | |
| TP631 | SQMX001-001Z | TEST PIN, ×4 | |

## D/C SERVO BOARD ASSY <05>

| #△REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| PWBA | PRK10029E | D/C SERVO BOARD ASSY | |
| IC1 | HD49722NT | IC | |
| IC2 | BU2767S | IC | |
| IC3 | TC4S66F | IC | |
| Q1 | DTC144EU | TRANSISTOR | |
| Q2 | DTC144EU | TRANSISTOR | |
| Q3 | DTA124EU | TRANSISTOR | |
| Q4 | DAN202U | DIODE | |
| Q5 | DTC124EU | TRANSISTOR | |
| Q6 | DTC144EU | TRANSISTOR | |
| Q7 | DTA144EU | TRANSISTOR | |
| Q8 | DTA124EU | TRANSISTOR | |
| Q9 | DTA124EU | TRANSISTOR | |
| Q10 | DTA124EU | TRANSISTOR | |
| Q11 | DTA124EU | TRANSISTOR | |
| D1 | 1SS133 | DIODE | |
| D2 | 1SS133 | DIODE | |
| D3 | 1SS133 | DIODE | |
| D4 | 1SS133 | DIODE | |
| D5 | 1SS133 | DIODE | |
| D6 | 1SS133 | DIODE | |
| D7 | 1SS133 | DIODE | |
| D8 | 1SS133 | DIODE | |
| D9 | 1SS133 | DIODE | |
| D10 | 1SS133 | DIODE | |
| D11 | 1SS133 | DIODE | |
| D12 | 1SS133 | DIODE | |
| D13 | 1SS133 | DIODE | |
| D14 | 1SS133 | DIODE | |
| D15 | 1SS133 | DIODE | |
| D16 | 1SS133 | DIODE | |
| D17 | 1SS133 | DIODE | |
| D18 | 1SS133 | DIODE | |
| D19 | 1SS133 | DIODE | |
| D20 | 1SS133 | DIODE | |
| D21 | 1SS133 | DIODE | |
| D22 | 1SS133 | DIODE | |
| D23 | 1SS133 | DIODE | |
| D24 | 1SS133 | DIODE | |
| R1 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R2 | QRSA08J-562YN | RESISTOR | 5.6kΩ,1/10W |
| R3 | QRSA08J-273YN | RESISTOR | 27kΩ,1/10W |
| R4 | QRSA08J-473YN | RESISTOR | 47kΩ,1/10W |
| R5 | QRSA08J-203YN | RESISTOR | 20kΩ,1/10W |
| R6 | QRSA08J-392YN | RESISTOR | 3.9kΩ,1/10W |
| R7 | QRSA08J-204YN | RESISTOR | 200kΩ,1/10W |
| R8 | QRSA08J-123YN | RESISTOR | 12kΩ,1/10W |
| R9 | QRSA08J-332YN | RESISTOR | 3.3kΩ,1/10W |
| R10 | QRSA08J-273YN | RESISTOR | 27kΩ,1/10W |
| R11 | QRSA08J-124YN | RESISTOR | 120kΩ,1/10W |
| R12 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R13 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R14 | QRSA08J-334YN | RESISTOR | 330kΩ,1/10W |
| R15 | QRSA08J-564YN | RESISTOR | 560kΩ,1/10W |
| R16 | QVZ3521-334 | V RESISTOR | 330kΩ |
| R17 | QRSA08J-184YN | RESISTOR | 180kΩ,1/10W |
| R18 | QVZ3521-334 | V RESISTOR | 330kΩ |
| R19 | QRSA08J-274YN | RESISTOR | 270kΩ,1/10W |
| R20 | QRSA08J-185YN | RESISTOR | 1.8MΩ,1/10W |
| R21 | QRSA08J-683YN | RESISTOR | 68kΩ,1/10W |
| R22 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R23 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R24 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |
| R26 | QRSA08J-334YN | RESISTOR | 330kΩ,1/10W |
| R27 | QRSA08J-392YN | RESISTOR | 3.9kΩ,1/10W |
| R28 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R29 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R30 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1/10W |
| R31 | QRSA08J-823YN | RESISTOR | 82kΩ,1/10W |
| R32 | QRSA08J-105YN | RESISTOR | 1MΩ,1/10W |
| R33 | QRSA08J-393YN | RESISTOR | 39kΩ,1/10W |
| R34 | QRSA08J-333YN | RESISTOR | 33kΩ,1/10W |
| R35 | QRSA08J-683YN | RESISTOR | 68kΩ,1/10W |
| R36 | QRSA08J-153YN | RESISTOR | 15kΩ,1/10W |
| R37 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |
| R38 | QRSA08J-105YN | RESISTOR | 1MΩ,1/10W |
| R39 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |

| #△REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| IC4 | UPD4030BG | IC |
| IC5 | TA78L005AP | IC |
| IC6 | TA78L009AP | IC |
| IC7 | NJM2904M | IC |
| IC8 | NJM2904M | IC |
| IC9 | UPD4053BG | IC |
| IC10 | NJM2904M | IC |
| IC11 | NJM2903M | IC |
| IC12 | UPD4053BG | IC |
| IC13 | BA6302AF | IC |
| IC14 | NJM2904M | IC |
| IC15 | NJM2903M | IC |
| IC16 | UPD4013BG | IC |
| IC17 | MN1280P | IC |
| IC18 | UPD4013BG | IC |
| IC19 | UPD4069UBG | IC |
| IC20 | UPD4081BG | IC |
| IC21 | UPD4081BG | IC |
| IC22 | UPD4538BG | IC |
| IC23 | UPD78P138GF019C | IC |
|  | or UPD78138GF-023 | IC |
| IC24 | IC-PST523H-2 | IC |
| IC25 | UPD4538BG | IC |
| IC26 | UPD4538BG | IC |
| IC27 | BA6302AF | IC |
| IC28 | NJM2903M | IC |
| Q1 | 2SD973AQ,R,S | TRANSISTOR |
| Q2 | DTC124EK | TRANSISTOR |
| Q3 | 2SD973AQ,R,S | TRANSISTOR |
| Q4 | DTC124EK | TRANSISTOR |
| Q5 | DTC124EK | TRANSISTOR |
| Q6 | DTC124EK | TRANSISTOR |
| Q7 | DTC124EK | TRANSISTOR |
| Q8 | DTC124EK | TRANSISTOR |
| Q9 | DTC124EK | TRANSISTOR |
| D1 | 1SS133 | DIODE |
| D2 | DA204K | DIODE |
| D4 | DAN202K | DIODE |
| D5 | DAN202K | DIODE |
| D6 | DAN202K | DIODE |
| D7 | 1SS133 | DIODE |
| D8 | 1SS133 | DIODE |
| D9 | 1SS133 | DIODE |
| D10 | 1SS133 | DIODE |
| D11 | 1SS133 | DIODE |
| D12 | DAN202K | DIODE |
| D13 | RD7.5ES-T1B2 | ZENER DIODE |
| D14 | 1SS133 | DIODE |
| D15 | 1SS133 | DIODE |
| D16 | 1SS133 | DIODE |
| D17 | 1SS133 | DIODE |
| D18 | 1SS133 | DIODE |
| D19 | 1SS133 | DIODE |
| D20 | 1SS133 | DIODE |

| #△REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| R1 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R2 | QRSA08J-333YN | RESISTOR | 33kΩ,1/10W |
| R3 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R4 | QVPC610-102 | V RESISTOR | 1kΩ |
| R5 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R6 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R7 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R8 | QRSA08J-333YN | RESISTOR | 33kΩ,1/10W |
| R9 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R10 | QVPC610-102 | V RESISTOR | 1kΩ |
| R11 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R12 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1/10W |
| R13 | QRSA08J-105YN | RESISTOR | 1MΩ,1/10W |
| R14 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R15 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R16 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1/10W |
| R17 | QRSA08J-105YN | RESISTOR | 1MΩ,1/10W |
| R18 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R19 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R20 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R22 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R23 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R24 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R25 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R27 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R28 | QRSA08J-182YN | RESISTOR | 1.8kΩ,1/10W |
| R29 | QRSA08J-123YN | RESISTOR | 12kΩ,1/10W |
| R30 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R31 | QRSA08J-683YN | RESISTOR | 68kΩ,1/10W |
| R32 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R33 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R34 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |
| R35 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |
| R36 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |
| R37 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |
| R38 | QVPC610-104 | V RESISTOR | 100kΩ |
| R39 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |
| R40 | QRSA08J-122YN | RESISTOR | 1.2kΩ,1/10W |
| R41 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R42 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R43 | QVPC610-332 | V RESISTOR | 3.3kΩ |
| R44 | QRSA08J-123YN | RESISTOR | 12kΩ,1/10W |
| R45 | QVPC610-472 | V RESISTOR | 4.7kΩ |
| R46 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R47 | QRSA08J-684YN | RESISTOR | 680kΩ,1/10W |
| R48 | QRSA08J-682YN | RESISTOR | 6.8kΩ,1/10W |
| R49 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R50 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R51 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R52 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R53 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R54 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R55 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R56 | QVPC610-154 | V RESISTOR | 150kΩ |
| R57 | QRSA08J-224YN | RESISTOR | 220kΩ,1/10W |
| R58 | QRSA08J-333YN | RESISTOR | 33kΩ,1/10W |
| R59 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |
| R60 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |

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| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| R61 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R62 | QVZ3521-103 | V RESISTOR | 10kΩ |
| R63 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R64 | QRSA08J-682YN | RESISTOR | 6.8kΩ,1/10W |
| R65 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R66 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R67 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R69 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R70 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |
| R71 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R72 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R73 | QRSA08J-473YN | RESISTOR | 47kΩ,1/10W |
| R74 | QRSA08J-333YN | RESISTOR | 33kΩ,1/10W |
| R75 | QVZ3521-103 | V RESISTOR | 10kΩ |
| R76 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R77 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R78 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R79 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R80 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R81 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R82 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R83 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R84 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R85 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R86 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R87 | QVZ3521-224 | V RESISTOR | 220kΩ |
| R88 | QRSA08J-124YN | RESISTOR | 120kΩ,1/10W |
| R89 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R90 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R91 | QRSA08J-563YN | RESISTOR | 56kΩ,1/10W |
| R92 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R93 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R94 | ERT-D2FHL103S | THERMISTOR | |
| R95 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R96 | QRSA08J-124YN | RESISTOR | 120kΩ,1/10W |
| R97 | QVZ3521-224 | V RESISTOR | 220kΩ |
| R98 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R100 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R101 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R102 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R103 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R104 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R105 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R106 | QRSA08J-0R0Y | RESISTOR | 0Ω,1/10W |
| R107 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R108 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R110 | QRSA08J-123YN | RESISTOR | 12kΩ,1/10W |
| R111 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R112 | QRSA08J-333YN | RESISTOR | 33kΩ,1/10W |
| R113 | QRSA08J-681YN | RESISTOR | 680Ω,1/10W |
| R114 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R115 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R116 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R117 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R118 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R119 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R120 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R121 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R122 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R123 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R124 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R125 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R126 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R127 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R128 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R129 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R130 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R132 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R133 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R134 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R135 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R136 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R137 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R138 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R139 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R140 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R141 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R142 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R143 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R144 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R145 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R146 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R147 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| R148 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1/10W |
| R150 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R151 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R152 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R153 | QRSA08J-682YN | RESISTOR | 6.8kΩ,1/10W |
| R154 | QRSA08J-154YN | RESISTOR | 150kΩ,1/10W |
| R155 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R156 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R157 | QRD161J-0R0 | RESISTOR | 0Ω,1/6W |
| R158 | QRSA08J-124YN | RESISTOR | 120kΩ,1/10W |
| R159 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R160 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R161 | QRSA08J-333YN | RESISTOR | 33kΩ,1/10W |
| R162 | QRSA08J-333YN | RESISTOR | 33kΩ,1/10W |
| R163 | QVZ3521-474 | V RESISTOR | 470kΩ |
| R164 | QVZ3521-474 | V RESISTOR | 470kΩ |
| R165 | QRSA08J-274YN | RESISTOR | 270kΩ,1/10W |
| R166 | QVZ3521-224 | V RESISTOR | 220kΩ |
| R167 | QRSA08J-183YN | RESISTOR | 18kΩ,1/10W |
| R168 | QRD167J-393 | RESISTOR | 39kΩ,1/6W |
| R169 | QRSA08J-274YN | RESISTOR | 270kΩ,1/10W |
| R170 | QRSA08J-104YN | RESISTOR | 100kΩ,1/10W |
| R171 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1/10W |
| R172 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| R173 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1/10W |
| R174 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R175 | QRV143F-3573 | CMF RESISTOR | 357kΩ,1/4W |
| R176 | QVZ3521-104 | V RESISTOR | 100kΩ |
| R177 | QRSA08J-334YN | RESISTOR | 330kΩ,1/10W |
| R178 | QRSA08J-823YN | RESISTOR | 82kΩ,1/10W |
| R179 | QVZ3521-473 | RESISTOR | 47kΩ |
| R180 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |

| #⚠ | REF No. | PART No. | PART NAME, | DESCRIPTION |
|---|---|---|---|---|
| | R181 | QRSA08J-682YN | RESISTOR | 6.8kΩ,1/10W |
| | R182 | QRSA08J-223YN | RESISTOR | 22kΩ,1/10W |
| | R183 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| | R184 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| | R185 | QRSA08J-0R0Y | RESISTOR | 0Ω,1/10W |
| | R186 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| | R187 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |
| | R188 | QRSA08J-561YN | RESISTOR | 560Ω,1/10W |
| | R189 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| | C1 | QCTA1CH-101 | CAPACITOR | 100pF |
| | C2 | QER61CM-106GZ | E CAPACITOR | 10μF,16V |
| | C3 | QCTA1CH-101 | CAPACITOR | 100pF |
| | C4 | QER61CM-106GZ | E CAPACITOR | 10μF,16V |
| | C5 | QCTA1CH-101 | CAPACITOR | 100pF |
| | C6 | QCTA1CH-101 | CAPACITOR | 100pF |
| | C7 | QFV41HJ-684 | TF CAPACITOR | 0.68μF,50V |
| | C8 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| | C9 | QCYA1HK-103 | CAPACITOR | 0.01μF,50V |
| | C10 | QCYA1HK-103 | CAPACITOR | 0.01μF,50V |
| | C11 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| | C12 | QCYA1HK-103 | CAPACITOR | 0.01μF,50V |
| | C13 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| | C14 | QCYA1HK-103 | CAPACITOR | 0.01μF,50V |
| | C15 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| | C16 | QCYA1HK-103 | CAPACITOR | 0.01μF,50V |
| | C17 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| | C18 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| | C19 | QCYA1HK-103 | CAPACITOR | 0.01μF,50V |
| | C20 | QCYA1HK-223 | CAPACITOR | 0.022μF,50V |
| | C21 | QCTA1CH-330 | CAPACITOR | 33pF |
| | C22 | QCYA1HK-103 | CAPACITOR | 0.01μF,50V |
| | C24 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| | C25 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| | C26 | QCTA1CH-221 | CAPACITOR | 220pF |
| | C27 | QFP42AJ-272 | PP CAPACITOR | 0.0027μF,100V |
| | C29 | QFN31HJ-392 | M CAPACITOR | 0.0039μF,50V |
| | C30 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| | C31 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| | C32 | QER61HM-104GZ | E CAPACITOR | 0.1μF,50V |
| | C33 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| | C34 | QER61HM-105GZ | E CAPACITOR | 1μF,50V |
| | C35 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| | C36 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| | C37 | QCYA1HK-102 | CAPACITOR | 0.001μF,50V |
| | C38 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| | C39 | QCTA1CH-391 | CAPACITOR | 390pF |
| | C40 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| | C41 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| | C42 | QCTA1CH-150 | CAPACITOR | 15pF |
| | C43 | QCTA1CH-150 | CAPACITOR | 15pF |
| | C50 | QER61CM-336 | E CAPACITOR | 33μF,16V |
| | C51 | QCYA1HK-223 | CAPACITOR | 0.022μF,50V |
| | C52 | QER61CM-106 | E CAPACITOR | 10μF,16V |
| | C53 | QCYA1HK-103 | CAPACITOR | 0.01μF,50V |
| | C54 | QCTA1CH-270 | CAPACITOR | 27pF |
| | C55 | QCTA1CH-470 | CAPACITOR | 47pF |
| | C56 | QER61HM-105GZ | E CAPACITOR | 1μF,50V |
| | C57 | QFP42AJ-103 | PP CAPACITOR | 0.01μF,100V |
| | C58 | QCYA1HK-223 | CAPACITOR | 0.022μF,50V |
| | C59 | QFV71HJ-104 | TF CAPACITOR | 0.1μF,50V |
| | C60 | QFV71HJ-104 | TF CAPACITOR | 0.1μF,50V |
| | C61 | QFV71HJ-104 | TF CAPACITOR | 0.1μF,50V |
| | C62 | QFV71HJ-104 | TF CAPACITOR | 0.1μF,50V |
| | C63 | QER61CM-106 | E CAPACITOR | 10μF,16V |
| | L1 | PU53223-101J | COIL | 100μH |
| | L2 | PU53223-101J | COIL | 100μH |
| | L3 | PU53223-101J | COIL | 100μH |
| ⚠ | X1 | PEVB0335 | CRYSTAL RESONATOR | |
| ⚠ | TH1 | PU52108-100K | POSITIVE THERMISTOR | |
| | TP1 | PU55774 | TEST PIN, ×6 | |
| | TP2 | PU54983 | TEST PIN, ×15 | |
| | CN1 | PU58844-5 | CONNECTOR | |
| | CN2 | PU58844-5Y | CONNECTOR | |
| | CN3 | PU58929-20 | HOUSING | |
| | CN4 | PU58929-20 | HOUSING | |
| | CN5 | PU58844-4R | CONNECTOR | |
| ⚠ | CP1 | ICP-F38 | CIRCUIT PROTECTOR | |

## MECHACON BOARD ASSY <07>

| #⚠ | REF No. | PART No. | PART NAME, | DESCRIPTION |
|---|---|---|---|---|
| | PWBA | PRK10093F | M.CTL BOARD ASSY | |
| | IC1 | ~~M37524E4-252SP~~ | IC M37524M4-321SP | |
| | IC2 | BA6259N | IC | |
| | IC3 | M50255P | IC | |
| | IC4 | TC4021BP | IC | |
| | IC5 | M6M80011AP | IC | |
| | IC6 | M50253P | IC | |
| | IC102 | TC4053BP | IC | |
| | IC103 | TC4053BP | IC | |
| | Q1 | 2SD973AR | TRANSISTOR | |
| | Q2 | DTC114ES | TRANSISTOR | |
| | Q3 | DTC114ES | TRANSISTOR | |
| | Q4 | 2SD637(RS) | TRANSISTOR | |
| | Q5 | 2SD637(RS) | TRANSISTOR | |
| | Q6 | 2SD637(RS) | TRANSISTOR | |

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| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| Q7 | 2SD973R | TRANSISTOR | |
| Q8 | DTC114ES | TRANSISTOR | |
| Q9 | DTA144ES | TRANSISTOR | |
| Q11 | DTC144ES | TRANSISTOR | |
| Q12 | DTC144ES | TRANSISTOR | |
| Q13 | DTC144ES | TRANSISTOR | |
| Q101 | DTA124ES | TRANSISTOR | |
| Q102 | 2SD637(RS) | TRANSISTOR | |
| Q103 | 2SD637(RS) | TRANSISTOR | |
| Q104 | 2SD637(RS) | TRANSISTOR | |
| D1 | HZS4.3EB2 | ZENER DIODE | |
| D2 | 1SS133 | DIODE | |
| D3 | 1SS133 | DIODE | |
| D4 | 1SS133 | DIODE | |
| D5 | 1SS133 | DIODE | |
| D6 | HZS7.5EB2 | ZENER DIODE | |
| D7 | 1SS133 | DIODE | |
| D8 | 1SS133 | DIODE | |
| D9 | V03C | DIODE | |
| D10 | 1SS133 | DIODE | |
| D11 | QRD161J-471 | DIODE | |
| D12 | 1SS133 | DIODE | |
| D14 | 1SS133 | DIODE | |
| D15 | 1SS133 | DIODE | |
| D101 | 1SS133 | DIODE | |
| D102 | 1SS133 | DIODE | |
| D103 | 1SS133 | DIODE | |
| D104 | 1SS133 | DIODE | |
| R1 | QRD161J-152 | RESISTOR | 1.5kΩ,1/6W |
| R2 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R3 | QRD161J-331 | RESISTOR | 330Ω,1/6W |
| R4 | QRD161J-822 | RESISTOR | 8.2kΩ,1/6W |
| R5 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R6 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R7 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R8 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R9 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R10 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R11 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R12 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R13 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R14 | QRD161J-124 | RESISTOR | 120kΩ,1/6W |
| R15 | QRD161J-124 | RESISTOR | 120kΩ,1/6W |
| R16 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R17 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R18 | QRD161J-333 | RESISTOR | 33kΩ,1/6W |
| R19 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R20 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R21 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R22 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R23 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R24 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R25 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| R26 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R27 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R28 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R29 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R30 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R31 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R32 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R33 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R34 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R35 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R36 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R37 | QRD161J-332 | RESISTOR | 3.3kΩ,1/6W |
| R39 | QRD161J-823 | RESISTOR | 82kΩ,1/6W |
| R40 | QRD161J-122 | RESISTOR | 1.2kΩ,1/6W |
| R41 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R42 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R43 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R44 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R45 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R46 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R47 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R48 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R49 | QRD161J-105 | RESISTOR | 1MΩ,1/6W |
| R50 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R51 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R52 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R53 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R54 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R55 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R56 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R57 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R58 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R59 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R60 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R61 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R62 | QRD161J-0R0 | RESISTOR | 0Ω,1/6W |
| R63 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R64 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R65 | QRD161J-682 | RESISTOR | 6.8kΩ,1/6W |
| R66 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R67 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R69 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R70 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R71 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R72 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R73 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R74 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R75 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R76 | QRD161J-473 | RESISTOR | 47kΩ,1/6W |
| R77 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R78 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R79 | QRD161J-562 | RESISTOR | 5.6kΩ,1/6W |
| R80 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R81 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R85 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R87 | QRD161J-272 | RESISTOR | 2.7kΩ,1/6W |
| R89 | QRD161J-221 | RESISTOR | 220Ω,1/6W |

| #△REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| R107 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| R108 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| R109 | QRD161J-124 | RESISTOR | 120kΩ,1/6W |
| R110 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R111 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R112 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R113 | QRD161J-333 | RESISTOR | 33kΩ,1/6W |
| R114 | QRD161J-333 | RESISTOR | 33kΩ,1/6W |
| R115 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R116 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R117 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| RA1 | QRB047J-472 | NETWORK RESISTOR | 4.7kΩ |
| | or QRB049J-472 | RESISTOR ARRAY | 4.7kΩ |
| RA2 | QRB047J-103 | RESISTOR ARRAY | 10kΩ |
| | or QRB049J-103 | RESISTOR ARRAY | 10kΩ |
| RA3 | QRB067J-103 | NETWORK RESISTOR | 10kΩ |
| C1 | QETC1EM-335 | E CAPACITOR | 3.3μF,25V |
| C2 | QCF31HP-223 | CAPACITOR | 0.022μF,50V |
| C3 | QCF31HP-223 | CAPACITOR | 0.022μF,50V |
| C4 | QCF31HP-473 | CAPACITOR | 0.047μF,50V |
| C5 | QCF31HP-223 | CAPACITOR | 0.022μF,50V |
| C6 | QCF31HP-223 | CAPACITOR | 0.022μF,50V |
| C7 | QCS31HJ-101 | CAPACITOR | 100pF,50V |
| C8 | QCS31HJ-101 | CAPACITOR | 100pF,50V |
| C9 | QCS31HJ-101 | CAPACITOR | 100pF,50V |
| C10 | QCS31HJ-101 | CAPACITOR | 100pF,50V |
| C11 | QCF31HP-473 | CAPACITOR | 0.047μF,50V |
| C12 | QETC1EM-475 | E CAPACITOR | 4.7μF,25V |
| C13 | QCF31HP-473 | CAPACITOR | 0.047μF,50V |
| C14 | QCS31HJ-680 | CAPACITOR | 68pF,50V |
| C15 | QCS31HJ-680 | CAPACITOR | 68pF,50V |
| C16 | QEK61CM-107 | E CAPACITOR | 100μF,16V |
| C17 | QCF31HP-222 | CAPACITOR | 0.0022μF,50V |
| C18 | QCF31HP-473 | CAPACITOR | 0.047μF,50V |
| C19 | QCS31HJ-680 | CAPACITOR | 68pF,50V |
| C20 | QCS31HJ-680 | CAPACITOR | 68pF,50V |
| C22 | QCS31HJ-680 | CAPACITOR | 68pF,50V |
| C23 | QCS31HJ-680 | CAPACITOR | 68pF,50V |
| C24 | QER61EM-335 | E CAPACITOR | 3.3μF,25V |
| C25 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C26 | QCF31HP-102 | CAPACITOR | 0.001μF,50V |
| C27 | QCF11HP-223 | CAPACITOR | 0.022μF,50V |
| C104 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C105 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C106 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C107 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C110 | QER61CM-106 | E CAPACITOR | 10μF,16V |
| C111 | QCVB1CN-103 | CAPACITOR | 0.01μF,16V |
| L1 | PU59152-100J | COIL | 10μH |
| L102 | PU59152-101J | COIL | 100μH |

| #△REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| CF1 | PU60030 | RESONATOR |
| K2 | PGZ00354 | FERRATE BEADS |
| K3 | PGZ00354 | FERRATE BEADS |
| K4 | PGZ00354 | FERRATE BEADS |
| K5 | PGZ00354 | FERRATE BEADS |
| K6 | PGZ00354 | FERRATE BEADS |
| K7 | PGZ00354 | FERRATE BEADS |
| TH1 | PU52108-100 | POSITIVE THERMISTOR |
| TH2 | PU52108-100 | POSITIVE THERMISTOR |
| TH101 | ERT-D2FHL103S | THERMISTOR |
| SKT1 | PGZ01957-064 | IC SOCKET |
| TP1 | PU54983 | TEST PIN |
| CN1 | PU59555-2 | CONNECTOR |
| CN2 | PU58930-16 | CONNECTOR |
| CN3 | PU58928-20 | CONNECTOR |
| CN4 | PU58928-20 | CONNECTOR |
| CN5 | PU58844-3 | CONNECTOR |
| CN6 | PU58844-3R | CONNECTOR |
| CN7 | PU58930-20 | CONNECTOR |
| CN8 | PU58844-2R | CONNECTOR |
| CN9 | PU58844-2 | CONNECTOR |
| CN10 | PU58844-8Y | CONNECTOR |
| CN11 | PU58844-8 | CONNECTOR |
| CN13 | PU58844-10 | CONNECTOR |
| CN14 | PU58844-2Y | CONNECTOR |
| CN15 | PU58844-4 | CONNECTOR |
| CN16 | PU58844-5 | CONNECTOR |
| CN17 | PU58844-6Y | CONNECTOR |
| CN18 | PU59934-17 | WIRE HOLDER |
| CN19 | PU58844-8 | CONNECTOR |
| CN20 | PU58844-5Y | CONNECTOR |
| CN21 | PU58844-5R | CONNECTOR |
| CN23 | PU58844-6 | CONNECTOR |
| CN26 | PU58844-14 | CONNECTOR |
| CN27 | PU59555-6 | CONNECTOR |
| CN28 | PU58844-7 | CONNECTOR |
| CN29 | PU58844-2R | CONNECTOR |
| CN30 | PU58844-2 | CONNECTOR |
| CN31 | PU58844-2Y | CONNECTOR |
| CN32 | PU58844-9 | CONNECTOR |
| CN35 | PU58844-2 | CONNECTOR |
| CN36 | PU59555-6 | CONNECTOR |

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## MAIN SUB BOARD ASSY <08>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| PWBA | PRK10165A2 | MAIN SUB BOARD ASSY | |
| IC501 | TA7347P | IC | |
| IC502 | AN608P | IC | |
| IC503 | M51204TL | IC | |
| IC504 | M51204TL | IC | |
| IC505 | TC4538BP | IC | |
| IC506 | M51204TL | IC | |
| IC507 | M51204TL | IC | |
| Q501 | 2SA933S(Q) | TRANSISTOR | |
| Q502 | 2SA933S(Q) | TRANSISTOR | |
| Q503 | 2SC1740S(Q) | TRANSISTOR | |
| Q504 | 2SC1740S(Q) | TRANSISTOR | |
| Q505 | DTC124ES | TRANSISTOR | |
| Q506 | DTC124ES | TRANSISTOR | |
| Q507 | DTC124ES | TRANSISTOR | |
| Q508 | 2SC1740S(Q) | TRANSISTOR | |
| Q509 | 2SC1740S(Q) | TRANSISTOR | |
| Q510 | DTC124ES | TRANSISTOR | |
| Q511 | 2SC1740S(Q) | TRANSISTOR | |
| Q512 | DTC124ES | TRANSISTOR | |
| D502 | 1SS133 | DIODE | |
| R501 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R502 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R503 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R504 | QRD161J-221 | RESISTOR | 220Ω,1/6W |
| R505 | QRD161J-821 | RESISTOR | 820Ω,1/6W |
| R506 | QRD161J-471 | RESISTOR | 470Ω,1/6W |
| R507 | QRD161J-101 | RESISTOR | 100Ω,1/6W |
| R508 | QRD161J-392 | RESISTOR | 3.9kΩ,1/6W |
| R509 | QRD161J-221 | RESISTOR | 220Ω,1/6W |
| R510 | QRD161J-332 | RESISTOR | 3.3kΩ,1/6W |
| R511 | QVZ3518-222AZ | V RESISTOR | 2.2kΩ |
| R512 | QRD161J-332 | RESISTOR | 3.3kΩ,1/6W |
| R513 | QVZ3518-332AZ | V RESISTOR | 3.3kΩ |
| R514 | QRD161J-272 | RESISTOR | 2.7kΩ,1/6W |
| R515 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R516 | QRD161J-392 | RESISTOR | 3.9kΩ,1/6W |
| R517 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R518 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R519 | QRD161J-361 | RESISTOR | 360Ω,1/6W |
| R520 | QRD161J-392 | RESISTOR | 3.9kΩ,1/6W |
| R521 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R522 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R523 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R524 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R525 | QRD161J-393 | RESISTOR | 39kΩ,1/6W |
| R526 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R527 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R528 | QRD161J-333 | RESISTOR | 33kΩ,1/6W |
| R529 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R530 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R531 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R532 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R533 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R534 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R535 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R536 | QRD161J-562 | RESISTOR | 5.6kΩ,1/6W |
| R537 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R538 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R539 | QRD161J-561 | RESISTOR | 560Ω,1/6W |
| C501 | QCS31HJ-331 | CAPACITOR | 330pF,50V |
| C502 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C503 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C504 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C505 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C506 | QETC0JM-107 | E CAPACITOR | 100μF,6.3V |
| C507 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C508 | QETC1CM-107 | E CAPACITOR | 100μF,16V |
| C509 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C510 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C511 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C512 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C513 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| C514 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| C515 | QFN31HJ-183 | M CAPACITOR | 0.018μF,50V |
| C516 | QFN31HJ-184 | M CAPACITOR | 0.18μF,50V |
| C517 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C518 | QETC1CM-476 | E CAPACITOR | 47μF,16V |
| L501 | PU48530-101J | COIL | 100μH |
| L502 | PU48530-101J | COIL | 100μH |
| L503 | PU48530-101J | COIL | 100μH |
| L504 | PU48530-101J | COIL | 100μH |
| L505 | PU48530-101J | COIL | 100μH |
| TH501 | ERT-D2FGL101S | THERMISTOR | |
| TH502 | ERT-D2FGL101S | THERMISTOR | |
| TH503 | ERT-D2FGL101S | THERMISTOR | |
| CN501 | PU59555-3 | CONNECTOR | |
| CN502 | PU59555-8 | CONNECTOR | |
| CN503 | PU59555-4 | CONNECTOR | |
| CN504 | PU59555-4Y | CONNECTOR | |

## VIDEO SUB BOARD ASSY <10>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| PWBA | PRK30034E | VIDEO SUB BOARD ASSY |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| IC1 | BU3791 | IC | |
| Q1 | DTC144ES | TRANSISTOR | |
| Q2 | DTC124ES | TRANSISTOR | |
| Q3 | DTC144WS | TRANSISTOR | |
| D1 | 1SS133 | DIODE | |
| D2 | 1SS133 | DIODE | |
| R1 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R2 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R3 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R4 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R5 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R6 | QRD161J-822 | RESISTOR | 8.2kΩ,1/6W |
| R7 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R8 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R9 | QRD161J-563 | RESISTOR | 56kΩ,1/6W |
| R10 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| C1 | QCBB1HJ-102 | CAPACITOR | 0.001μF,50V |
| C2 | QCC11CK-104 | CAPACITOR | 0.1μF,16V |
| C3 | QCBB1HJ-102 | CAPACITOR | 0.001μF,50V |
| C4 | QCBB1HJ-121 | CAPACITOR | 120pF,50V |
| C5 | QEK61AM-336 | E CAPACITOR | 33μF,10V |
| C6 | QFN31HJ-103 | M CAPACITOR | 0.01μF,50V |
| CN1 | PU59555-7 | CONNECTOR | |
| CN2 | PU58844-7R | CONNECTOR | |
| CN3 | PU59555-5 | CONNECTOR | |
| CN4 | PU58844-3 | CONNECTOR | |
| CN5 | PU58844-2 | CONNECTOR | |

## A/C HEAD BOARD <12>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| PWB | PB40029 | A/C HEAD BOARD | |
| CN1 | PU58844-103 | CONNECTOR | |
| CN2 | PU58844-104B | CONNECTOR | |

## PRE/REC BOARD ASSY <43>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| PWBA | PRK10031C | PRE/REC BOARD ASSY | |
| IC1 | TA8609P | IC | |
| IC2 | TA8733F | IC | |
| IC3 | MN4052BS<br>or UPD4052BG | IC<br>IC | |
| IC4 | AN6392 | IC | |
| IC5 | TC4S81F | IC | |
| IC6 | TC4S71F | IC | |
| Q1 | 2SC2412K | TRANSISTOR | |
| Q2 | 2SC2412K | TRANSISTOR | |
| Q3 | 2SC2412K | TRANSISTOR | |
| Q4 | 2SC2412K | TRANSISTOR | |
| Q5 | 2SA1036K(R) | TRANSISTOR | |
| Q6 | DTC124EK | TRANSISTOR | |
| Q7 | 2SA1036K(R) | TRANSISTOR | |
| Q8 | 2SC2412K | TRANSISTOR | |
| Q9 | 2SC2412K | TRANSISTOR | |
| Q10 | 2SC2412K | TRANSISTOR | |
| Q11 | 2SA1037K | TRANSISTOR | |
| Q12 | DTC144EK | TRANSISTOR | |
| Q13 | 2SA1037K | TRANSISTOR | |
| Q14 | DTC144EK | TRANSISTOR | |
| Q15 | 2SA1037K | TRANSISTOR | |
| Q16 | DTC144EK | TRANSISTOR | |
| Q17 | DTC144WK | TRANSISTOR | |
| Q19 | DTC124EK | TRANSISTOR | |
| Q101 | DTA124EK | TRANSISTOR | |
| Q103 | DTC124EK | TRANSISTOR | |
| Q107 | 2SC2412K | TRANSISTOR | |
| Q108 | 2SA1037K | TRANSISTOR | |
| Q109 | 2SC2412K | TRANSISTOR | |
| Q110 | 2SA1037K | TRANSISTOR | |
| Q111 | DTC124EK | TRANSISTOR | |
| Q112 | 2SC2412K | TRANSISTOR | |
| D1 | DAN202K | DIODE | |
| D2 | DAN202K | DIODE | |
| D3 | DAN202K | DIODE | |
| D4 | DAN202K | DIODE | |
| D5 | DAN202K | DIODE | |
| D6 | DAN202K | DIODE | |
| D7 | DAN202K | DIODE | |
| D102 | DAP202K | DIODE | |
| D103 | DAN202K | DIODE | |
| R1 | QRSA08J-100YN | RESISTOR | 10Ω,1/10W |
| R2 | QRSA08J-272YN | RESISTOR | 2.7kΩ,1/10W |
| R3 | QRSA08J-100YN | RESISTOR | 10Ω,1/10W |
| R4 | QRSA08J-272YN | RESISTOR | 2.7kΩ,1/10W |
| R5 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R6 | QRSA08J-100YN | RESISTOR | 10Ω,1/10W |
| R7 | QRSA08J-272YN | RESISTOR | 2.7kΩ,1/10W |
| R8 | QRSA08J-100YN | RESISTOR | 10Ω,1/10W |
| R9 | QRSA08J-272YN | RESISTOR | 2.7kΩ,1/10W |
| R10 | QRSA08J-103YN | RESISTOR | 10kΩ,1/10W |
| R11 | QRSA08J-102YN | RESISTOR | 1kΩ,1/10W |

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| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| R12 | QVPC402-152 | V RESISTOR | 1.5kΩ |
| R13 | QVPC402-152 | V RESISTOR | 1.5kΩ |
| R14 | QRSA08J-103YN | RESISTOR | 10kΩ,1／10W |
| R15 | QVPC402-152 | V RESISTOR | 1.5kΩ |
| R16 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| R17 | QRSA08J-821YN | RESISTOR | 820Ω,1／10W |
| R18 | QVPC402-152 | V RESISTOR | 1.5kΩ |
| R19 | QRD161J-333 | RESISTOR | 33kΩ,1／6W |
| R20 | QRSA08J-101YN | RESISTOR | 100Ω,1／10W |
| R21 | QRSA08J-393YN | RESISTOR | 39kΩ,1／10W |
| R22 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1／10W |
| R23 | QRSA08J-103YN | RESISTOR | 10kΩ,1／10W |
| R24 | QRSA08J-103YN | RESISTOR | 10kΩ,1／10W |
| R25 | QRSA08J-393YN | RESISTOR | 39kΩ,1／10W |
| R26 | QRD161J-222 | RESISTOR | 2.2kΩ,1／6W |
| R27 | PU52108-150 | POSITIVE THERMISTOR | |
| R28 | QRSA08J-221YN | RESISTOR | 220Ω,1／10W |
| R29 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| R30 | QRSA08J-122YN | RESISTOR | 1.2kΩ,1／10W |
| R31 | QRSA08J-221YN | RESISTOR | 220Ω,1／10W |
| R32 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| R33 | QRSA08J-122YN | RESISTOR | 1.2kΩ,1／10W |
| R34 | QRSA08J-103YN | RESISTOR | 10kΩ,1／10W |
| R35 | QRSA08J-122YN | RESISTOR | 1.2kΩ,1／10W |
| R36 | QRSA08J-103YN | RESISTOR | 10kΩ,1／10W |
| R37 | QRSA08J-122YN | RESISTOR | 1.2kΩ,1／10W |
| R38 | QRSA08J-103YN | RESISTOR | 10kΩ,1／10W |
| R39 | QRSA08J-122YN | RESISTOR | 1.2kΩ,1／10W |
| R40 | QRSA08J-393YN | RESISTOR | 39kΩ,1／10W |
| R41 | QRSA08J-821YN | RESISTOR | 820Ω,1／10W |
| R42 | QRSA08J-393YN | RESISTOR | 39kΩ,1／10W |
| R43 | QRSA08J-681YN | RESISTOR | 680Ω,1／10W |
| R44 | QRSA08J-393YN | RESISTOR | 39kΩ,1／10W |
| R45 | QRSA08J-681YN | RESISTOR | 680Ω,1／10W |
| R46 | QRSA08J-623YN | RESISTOR | 62kΩ,1／10W |
| R47 | QRSA08J-821YN | RESISTOR | 820Ω,1／10W |
| R48 | QRSA08J-680YN | RESISTOR | 68Ω,1／10W |
| R49 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| R50 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1／10W |
| R51 | QRSA08J-391YN | RESISTOR | 390Ω,1／10W |
| R52 | QRSA08J-123YN | RESISTOR | 12kΩ,1／10W |
| R53 | QRSA08J-680YN | RESISTOR | 68Ω,1／10W |
| R54 | QRSA08J-472YN | RESISTOR | 4.7kΩ,1／10W |
| R55 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| R56 | QRSA08J-103YN | RESISTOR | 10kΩ,1／10W |
| R57 | QRSA08J-103YN | RESISTOR | 10kΩ,1／10W |
| R58 | QRSA08J-823YN | RESISTOR | 82kΩ,1／10W |
| R59 | QRSA08J-681YN | RESISTOR | 680Ω,1／10W |
| R60 | QRSA08J-103YN | RESISTOR | 10kΩ,1／10W |
| R61 | QRSA08J-561YN | RESISTOR | 560Ω,1／10W |
| R101 | QRSA08J-223YN | RESISTOR | 22kΩ,1／10W |
| R102 | QRSA08J-273YN | RESISTOR | 27kΩ,1／10W |
| R115 | QRSA08J-471YN | RESISTOR | 470Ω,1／10W |
| R116 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| R117 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| R118 | QRSA08J-122YN | RESISTOR | 1.2kΩ,1／10W |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| R119 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| R120 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| R121 | QRSA08J-471YN | RESISTOR | 470Ω,1／10W |
| R122 | QRSA08J-561YN | RESISTOR | 560Ω,1／10W |
| R123 | QRSA08J-122YN | RESISTOR | 1.2kΩ,1／10W |
| R124 | QRSA08J-821YN | RESISTOR | 820Ω,1／10W |
| R125 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| R126 | QRSA08J-122YN | RESISTOR | 1.2kΩ,1／10W |
| R127 | QRSA08J-222YN | RESISTOR | 2.2kΩ,1／10W |
| R128 | QRSA08J-681YN | RESISTOR | 680Ω,1／10W |
| R129 | QRSA08J-101YN | RESISTOR | 100Ω,1／10W |
| R130 | QVPC603-682 | V RESISTOR | 6.8kΩ |
| R131 | QVPC603-332 | V RESISTOR | 3.3kΩ |
| R134 | QRSA08J-102YN | RESISTOR | 1kΩ,1／10W |
| C1 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C2 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C3 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C4 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C5 | QCVB1CN-103 | CAPACITOR | 0.01μF,16V |
| C6 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C7 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C8 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C9 | QCSA1HJ-680 | CAPACITOR | 68pF,50V |
| C10 | QCSA1HJ-680 | CAPACITOR | 68pF,50V |
| C11 | QCSA1HJ-560 | CAPACITOR | 56pF,50V |
| C12 | QCSA1HJ-560 | CAPACITOR | 56pF,50V |
| C13 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C14 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C15 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C16 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C17 | QER51HM-105 | E CAPACITOR | 1μF,50V |
| C18 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C19 | QER51HM-105 | E CAPACITOR | 1μF,50V |
| C20 | QCSA1HJ-101 | CAPACITOR | 100pF,50V |
| C21 | QER51HM-105 | E CAPACITOR | 1μF,50V |
| C22 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C23 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C24 | QER50JM-476 | E CAPACITOR | 47μF,6.3V |
| C25 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C26 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C27 | QER51HM-105 | E CAPACITOR | 1μF,50V |
| C28 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C29 | QER50JM-476 | E CAPACITOR | 47μF,6.3V |
| C30 | QER51HM-104 | E CAPACITOR | 0.1μF,50V |
| C31 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C32 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C33 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C34 | QCSA1HJ-821 | CAPACITOR | 820pF,50V |
| C35 | QRSA08J-0R0Y | RESISTOR | 0Ω,1／10W |
| C37 | QCSA1HJ-121 | CAPACITOR | 120pF,50V |
| C38 | QCSA1HJ-121 | CAPACITOR | 120pF,50V |
| C39 | QCSA1HJ-331 | CAPACITOR | 330pF,50V |
| C40 | QER50JM-476 | E CAPACITOR | 47μF,6.3V |
| C41 | QEE81EM-105 | TANTAL CAPACITOR | 1μF,25V |
| C42 | QEE81EM-105 | TANTAL CAPACITOR | 1μF,25V |

| #⚠REF No. | PART No. | PART NAME, | DESCRIPTION |
|---|---|---|---|
| C43 | QEE81EM-105 | TANTAL CAPACITOR | 1μF,25V |
| C44 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C45 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C46 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C47 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C48 | QER50JM-476 | E CAPACITOR | 47μF,6.3V |
| C49 | QER51CM-476 | E CAPACITOR | 47μF,16V |
| C50 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C51 | QFN41HJ-273 | M CAPACITOR | 0.027μF,50V |
| C52 | QFN41HJ-103 | M CAPACITOR | 0.01μF,50V |
| C53 | QER51HM-105 | E CAPACITOR | 1μF,50V |
| C54 | QCSA1HJ-470 | CAPACITOR | 47pF,50V |
| C55 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C56 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C57 | QCSA1HJ-9R0 | CAPACITOR | 9pF,50V |
| C58 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C60 | QCFA1EZ-104 | CAPACITOR | 0.1μF,25V |
| C101 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C102 | QCSA1HJ-680 | CAPACITOR | 68pF,50V |
| C110 | QER50JM-476 | E CAPACITOR | 47μF,6.3V |
| C111 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C112 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C113 | QCSA1HJ-100 | CAPACITOR | 10pF,50V |
| C114 | QCSA1HJ-360 | CAPACITOR | 36pF,50V |
| C115 | QCSA1HJ-220 | CAPACITOR | 22pF,50V |
| C117 | QCSA1HJ-180 | CAPACITOR | 18pF,50V |
| C118 | QCFA1HZ-103 | CAPACITOR | 0.01μF,50V |
| C119 | QCSA1HJ-470 | CAPACITOR | 47pF,50V |
| C121 | QCFA1EZ-104 | CAPACITOR | 0.1μF,25V |
| L4 | PU48530-101K | COIL | 100μH |
| L5 | PU48530-101K | COIL | 100μH |
| L9 | PU59152-330J | COIL | 33μH |
| L10 | PU59152-181J | COIL | 180μH |
| L11 | PU59152-4R7K | COIL | 4.7μH |
| L12 | PU59152-330J | COIL | 33μH |
| L13 | PU48530-101K | COIL | 100μH |
| L14 | PU48530-101K | COIL | 100μH |
| L106 | PU48530-101K | COIL | 100μH |
| L107 | PU59152-820J | COIL | 82μH |
| L108 | PU59152-390J | COIL | 39μH |
| L109 | PU59152-220J | COIL | 22μH |
| L110 | PU59152-220J | COIL | 22μH |
| L114 | PU59152-330J | COIL | 33μH |
| BKT1 | PQ42955 | BOARD BRACKET | |
| ETH1 | PQ40433-2 | EARTH LUG | |
| SCW1 | DPSP2606Z | SCREW, ×2 | |
| SCW2 | WBS2600Z | T.L.WASHER | |
| SCW3 | DPSP2606Z | SCREW | |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| SLD1 | PU36485 | SHIELD PLATE |
| SLD2 | PU36486 | SHIELD CASE |
| SPC1 | PU59210-001 | W.LOCKING SPACER, ×5 |
| TP1 | PU56008 | TEST-PIN, ×8 |
| CN1 | PU56258-10 | CONNECTOR |
| CN2 | PU59555-3 | CONNECTOR |
| CN3 | PU58844-3R | CONNECTOR |
| CN4 | PU58844-5R | CONNECTOR |
| CN5 | PU58844-5Y | CONNECTOR |
| CN6 | PU58844-4 | CONNECTOR |
| CN7 | PU58844-5 | CONNECTOR |

## DECK TERMINAL BOARD ASSY <51>

| | | | |
|---|---|---|---|
| PWBA | PB20013C1 | DECK TERMINAL BOARD ASSY | |
| R1 | QRD181J-151 | RESISTOR | 150Ω,1/8W |
| R3 | QRD181J-331 | RESISTOR | 330Ω,1/8W |
| PS1 | PU60271 | PHOTO INTERRUPTER | |
| CN1 | PEMC0722-017 | WIRE TRAP | |
| | or PEMC0753-017 | WIRE TRAP | |

## RELAY BOARD ASSY <52>

| | | |
|---|---|---|
| PWBA | PB20013A2-01 | RELAY BOARD ASSY |
| LC1 | PU59736-223 | N FILTER |
| LC2 | PU59736-223 | N FILTER |

## REC SAFETY BOARD ASSY <53>

| | | |
|---|---|---|
| PWBA | PB20013A3 | REC SAFETY BOARD ASSY |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| S1 | PU58644-1-3 | REC SAFETY SWITCH | |

## END SENSOR BOARD ASSY <54>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| PWBA | PB20013A4 | END SENSOR BOARD ASSY |
| Q1 | PN268R-NC | PHOTO TRANSISTOR |
| HD1 | PQ31047-1-4 | END SENSOR HOLDER |
| CN1 | PU59945-102 | WIRE SOCKET |

## CASSETTE HOUSING BOARD ASSY <56>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| PWB | PB30043 | CASSETTE HOUSING BOARD | |
| | or PB30097 | CASSETTE HOUSING BOARD | |
| PT1 | PN268R-NC | PHOTO TRANSISTOR | |
| R1 | QRD162J-471 | RESISTOR | 470Ω,1/6W |
| PS1 | PU58879 | PHOTO INTERRUPTER | |
| CN1 | PU58844-106 | CONNECTOR | |

## MECHACON SUB BOARD ASSY <66>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| PWBA | PRK20139E | M.CTL SUB BOARD ASSY | |
| IC1 | LA7225 | IC | |
| IC203 | VC2032 | IC | |
| IC204 | VC2032 | IC | |
| Q1 | 2SA1309A(RS) | TRANSISTOR | |
| Q2 | 2SA1309A(RS) | TRANSISTOR | |
| R1 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R2 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R3 | QRD161J-120 | RESISTOR | 12Ω,1/6W |
| R4 | QRD161J-152 | RESISTOR | 1.5kΩ,1/6W |
| R5 | QRD161J-101 | RESISTOR | 100Ω,1/6W |
| R6 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R7 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R8 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R9 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| R10 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R11 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| R12 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R228 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R229 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R230 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R231 | QRD161J-561 | RESISTOR | 560Ω,1/6W |
| R232 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R233 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| R234 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| R235 | QRD161J-562 | RESISTOR | 5.6kΩ,1/6W |
| R236 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R237 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R238 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R239 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| C1 | QER61EM-475 | E CAPACITOR | 4.7μF,25V |
| C2 | QFN31HJ-273 | M CAPACITOR | 0.027μF,50V |
| C3 | QER61HM-225 | E CAPACITOR | 2.2μF,50V |
| C4 | QER61AM-476 | E CAPACITOR | 47μF,10V |
| C5 | QER60JM-476 | E CAPACITOR | 47μF,6.3V |
| C8 | QCBB1HJ-471 | CAPACITOR | 470pF,50V |
| C201 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C202 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C203 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C204 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C205 | QCS31HJ-101 | CAPACITOR | 100pF,50V |
| C206 | QCS31HJ-101 | CAPACITOR | 100pF,50V |
| C207 | QCF31HP-102 | CAPACITOR | 0.001μF,50V |
| C208 | QCS31HJ-101 | CAPACITOR | 100pF,50V |
| L1 | PU59060 | TRAP COIL | |
| L201 | PU48530-101J | COIL | 100μH |
| CN1 | PU58844-4 | CONNECTOR | |
| CN4 | PU59513-2 | CONNECTOR | |
| CN5 | PU59513-3 | CONNECTOR | |
| CN6 | PU58844-2 | CONNECTOR | |
| CN101 | PU58844-5R | CONNECTOR | |
| CN102 | PU58844-5 | CONNECTOR | |
| CN103 | PU59513-6 | CONNECTOR | |
| CN201 | PU59555-6 | CONNECTOR | |
| CN202 | PU58844-7 | CONNECTOR | |

## OSD/BATTERY BOARD ASSY <74>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| PWBA | PRK20142A | OSD/BATT BOARD ASSY | |
| SPC1 | PRD30030-15 | PAD | |

### - OSD/BATTERY BOARD(1)ASSY<74> -

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| PWBA | PRK20142A1 | OSD/BATT-1 BOARD ASSY | |
| BAT1 | PGZ00785 | BATTERY CASE, ×2 | |
| BAT2 | PGZ01334 | BATTERY CASE | |
| BAT3 | PRD30543 | BATTERY CASE | |
| BAT4 | PRD42905-02 | BATTERY SHEET | |
| IC1 | IC-PST523H-2 | IC | |
| Q1 | 2SA933S(RS) | TRANSISTOR | |
| Q2 | 2SD637(QRS) | TRANSISTOR | |
| Q51 | DTC114EF | TRANSISTOR | |
| D1 | 1SS133 | DIODE | |
| D2 | LTZ-MR15 | DIODE | |
| D3 | 1SS133 | DIODE | |
| D4 | 1SS133 | DIODE | |
| D5 | 1SS133 | DIODE | |
| R1 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R3 | QRD161J-272 | RESISTOR | 2.7kΩ,1/6W |
| R4 | QRD161J-104 | RESISTOR | 100kΩ,1/6W |
| R5 | QRD161J-561 | RESISTOR | 560Ω,1/6W |
| R6 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R7 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| R8 | QRD161J-392 | RESISTOR | 3.9kΩ,1/6W |
| R9 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| R10 | QRD161J-821 | RESISTOR | 820Ω,1/6W |
| R11 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R12 | QRD161J-562 | RESISTOR | 5.6kΩ,1/6W |
| R13 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R14 | QRD161J-681 | RESISTOR | 680Ω,1/6W |
| R15 | QRD161J-0R0 | RESISTOR | 0Ω,1/6W |
| R51 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R56 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| B22 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| B23 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| B24 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| C1 | QER61CM-476 | E CAPACITOR | 47μF,16V |
| C2 | QCVB1CN-103 | CAPACITOR | 0.01μF,16V |
| C3 | QER61CM-106 | E CAPACITOR | 10μF,16V |
| C4 | QER61CM-106 | E CAPACITOR | 10μF,16V |
| C5 | QER41AM-107 | E CAPACITOR | 100μF,10V |
| C6 | PU57672-400 | TRIMMER CAPACITOR | |
| C7 | QER61CM-476 | E CAPACITOR | 47μF,16V |
| C8 | QCVB1CN-103 | CAPACITOR | 0.01μF,16V |
| C9 | QER61CM-476 | E CAPACITOR | 47μF,16V |
| C10 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C11 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C12 | QCS31HJ-220 | CAPACITOR | 22pF,50V |
| C13 | QCS31HJ-561 | CAPACITOR | 560pF,50V |
| C14 | QCVB1CN-103 | CAPACITOR | 0.01μF,16V |
| C51 | QER61CM-476 | E CAPACITOR | 47μF,16V |
| L1 | PU59152-101J | COIL | 100μH |
| BUZ1 | PGZ01673 | BUZZER | |
| SCW1 | SDSP2606Z | SCREW, ×2 | |
| SPC1 | PRD43011 | SHEET | |
| TP1 | PU54983 | TEST PIN, ×2 | |
| CN1 | PU58844-7 | CONNECTOR | |
| CN2 | PU58844-8Y | CONNECTOR | |
| CN3 | PU58844-3R | CONNECTOR | |

### - OSD/BATTERY BOARD(2)ASSY<75> -

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| PWBA | PRK20142A2 | OSD/BATT-2 BOARD ASSY |
| IC101 | MB89010A-108 | IC |
| IC102 | BU4013B | IC |
| | or TC4013BP | IC |
| IC103 | M52684AP | IC |
| Q101 | 2SA1309A(RS) | TRANSISTOR |
| Q102 | DTC114EF | TRANSISTOR |

| #⚠ | REF No. | PART No. | PART NAME, | DESCRIPTION |
|---|---|---|---|---|
| | R101 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| | R105 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| | R106 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| | R107 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| | R108 | QRD161J-681 | RESISTOR | 680Ω,1/6W |
| | R109 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| | R110 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| | R111 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| | R112 | QRD161J-471 | RESISTOR | 470Ω,1/6W |
| | R113 | QRD161J-182 | RESISTOR | 1.8kΩ,1/6W |
| | R114 | QRD161J-154 | RESISTOR | 150kΩ,1/6W |
| | R115 | QRD161J-271 | RESISTOR | 270Ω,1/6W |
| | R116 | QRD161J-152 | RESISTOR | 1.5kΩ,1/6W |
| | R117 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| | R118 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| | C101 | QER61CM-476 | E CAPACITOR | 47μF,16V |
| | C102 | QCVB1CM-103 | CAPACITOR | 0.01μF,16V |
| | C103 | PU57601-335MC | E CAPACITOR | 3.3μF |
| | C104 | QCVB1CM-103 | CAPACITOR | 0.01μF,16V |
| | C105 | QCSB1HJ-100 | CAPACITOR | 10pF,50V |
| | C106 | QCSB1HJ-330 | CAPACITOR | 33pF,50V |
| | C107 | QER61HM-335GZ | E CAPACITOR | 3.3μF,50V |
| | C108 | QCBB1HJ-101 | CAPACITOR | 100pF,50V |
| | C109 | QER61CM-106 | E CAPACITOR | 10μF,16V |
| | C110 | QCVB1CM-103 | CAPACITOR | 0.01μF,16V |
| | C111 | QCXB1CN-152 | CAPACITOR | 0.0015μF,16V |
| | C112 | QCSB1HJ-220 | CAPACITOR | 22pF,50V |
| | C113 | QCVB1CM-103 | CAPACITOR | 0.01μF,16V |
| | C114 | QCVB1CM-103 | CAPACITOR | 0.01μF,16V |
| | C115 | QFN31HJ-222 | M CAPACITOR | 0.0022μF,50V |
| | C116 | QER61HM-105 | E CAPACITOR | 1μF,50V |
| | L101 | PU58333-120K | COIL | 12μH |
| | L102 | PU59152-100J | COIL | 10μH |
| ⚠ | CF101 | PU60086 | CERAMIC FILTER | |
| | TP101 | PU56008 | TEST-PIN | |
| | CN101 | PGZ01081-09 | CONNECTOR | |
| | CN102 | PGZ01081-04 | CONNECTOR | |
| | CN103 | PGZ01081-03 | CONNECTOR | |

## REAR-1 BOARD ASSY <76>

| #⚠ | REF No. | PART No. | PART NAME, | DESCRIPTION |
|---|---|---|---|---|
| | PWBA | PRK20148E | REAR-1 BOARD ASSY | |
| | Q1 | 2SC1740S(QRS) | TRANSISTOR | |
| | D5 | RD5.1EB | ZENER DIODE | |
| | D6 | RD5.1EB | ZENER DIODE | |
| | D7 | RD20EB | ZENER DIODE | |
| | D8 | RD20EB | ZENER DIODE | |
| | D9 | 1SS133 | DIODE | |
| | D10 | RD2.0EB | ZENER DIODE | |
| | R3 | QRD167J-750 | RESISTOR | 75Ω,1/6W |
| | R4 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| | R5 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| | R6 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| | RA1 | QRB077J-103 | RESISTOR ARRAY | 10kΩ |
| | | or QRB079J-103 | RESISTOR ARRAY | 10kΩ |
| | C1 | QCF31HP-223 | CAPACITOR | 0.022μF,50V |
| | C2 | QCF31HP-223 | CAPACITOR | 0.022μF,50V |
| | L1 | PU48530-101J | COIL | 100μH |
| | S1 | PGZ00469-02 | SLIDE SWITCH | |
| | S2 | QSS1K81-L01 | DIP SW | |
| | RY1 | PU56539 | DC RELAY | |
| ⚠ | TB1 | PGZ01267-06 | TERMINAL BOARD | |
| | VA1 | PU49624-2 | VARISTOR | |
| | VA2 | PU49624-2 | VARISTOR | |
| | CN3 | PU59513-4 | CONNECTOR | |
| | CN4 | PU59513-4R | CONNECTOR | |
| | CN5 | PU58844-109 | CONNECTOR | |
| | CN6 | PU58844-102 | CONNECTOR | |
| | CN7 | PU58844-104 | CONNECTOR | |

## DISPLAY/STEP BOARD ASSY <77>

| #⚠ | REF No. | PART No. | PART NAME, | DESCRIPTION |
|---|---|---|---|---|
| | PWBA | PRK10095E | DISPLAY ASSY | |

### - DISPLAY BOARD ASSY<77> -

| #⚠ | REF No. | PART No. | PART NAME, | DESCRIPTION |
|---|---|---|---|---|
| | | PRK10095E1 | DISPLAY BOARD ASSY | |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| IC1 | MSC7112-01SS | IC | |
| IC2 | M50253P | IC | |
| IC3 | M5232L | IC | |
| Q1 | DTA114EF | TRANSISTOR | |
| D1 | RD8.2EB2 | ZENER DIODE | |
| D7 | SLR-55DC3F | LE DIODE | |
| D8 | SLR-55MC3F | LE DIODE | |
| D9 | 1SS133 | DIODE | |
| D10 | 1SS133 | DIODE | |
| R1 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R2 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R3 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R4 | QRD161J-273 | RESISTOR | 27kΩ,1/6W |
| R5 | QRD161J-333 | RESISTOR | 33kΩ,1/6W |
| R6 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R7 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R8 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R9 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R10 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R11 | QRD161J-472 | RESISTOR | 4.7kΩ,1/6W |
| R13 | QRD161J-473 | RESISTOR | 47kΩ,1/6W |
| R14 | QRD161J-473 | RESISTOR | 47kΩ,1/6W |
| R15 | QRD161J-563 | RESISTOR | 56kΩ,1/6W |
| R16 | QRD161J-0R0 | RESISTOR | 0Ω,1/6W |
| R17 | QRD161J-271 | RESISTOR | 270Ω,1/6W |
| R22 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R23 | QVZ3507-474 | V RESISTOR | 470kΩ |
| R24 | PU60257 | V RESISTOR | 10kΩ |
| R25 | PGZ01674 | V RESISTOR | 1kΩ |
| R26 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| RA1 | QRB037J-222 | RESISTOR ARREY | 2.2kΩ |
| C1 | QCS31HJ-101 | CAPACITOR | 100pF,50V |
| C2 | QER61HM-104 | E CAPACITOR | 0.1μF,50V |
| C3 | QCF11HP-223 | CAPACITOR | 0.022μF,50V |
| C4 | QER60JM-336 | E CAPACITOR | 33μF,6.3V |
| C5 | QCS31HJ-151 | CAPACITOR | 150pF,50V |
| C6 | QCF11HP-473 | CAPACITOR | 0.047μF,50V |
| C7 | QCS31HJ-151 | CAPACITOR | 150pF,50V |
| C8 | QCS31HJ-151 | CAPACITOR | 150pF,50V |
| C9 | QCS31HJ-680 | CAPACITOR | 68pF,50V |
| C10 | QCS31HJ-680 | CAPACITOR | 68pF,50V |
| C11 | QER41HM-106 | E CAPACITOR | 10μF,50V |
| C12 | QER41HM-475 | E CAPACITOR | 4.7μF,50V |
| C13 | QFN41HJ-104 | M CAPACITOR | 0.1μF,50V |
| C14 | QCF31HP-102 | CAPACITOR | 0.001μF,50V |
| S1 | PU53598 | TACT SWITCH | |
| | or PU57550 | TACT SWITCH | |

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| S2 | PU53598 | TACT SWITCH |
| | or PU57550 | TACT SWITCH |
| FDP1 | PGZ01589 | FLUORESCENT DISPLAY PANEL |
| HD1 | PQ31309 | FDP HOLDER(L) |
| HD2 | PQ31310 | FDP HOLDER(R) |
| HD3 | PQM30038-1-2 | LED HOLDER, ×2 |
| JA1 | PGZ01671 | PIN JACK |
| CN1 | PU59513-6 | CONNECTOR |
| CN2 | PU58844-3 | CONNECTOR |
| CN3 | PU58844-102R | CONNECTOR |
| CN4 | PU58844-5Y | CONNECTOR |
| CN5 | PU58844-2 | CONNECTOR |
| CN6 | PU58844-3R | CONNECTOR |
| CN7 | PU58844-4Y | CONNECTOR |
| CN8 | PU58844-2Y | CONNECTOR |
| CN9 | PU58844-4 | CONNECTOR |
| CN10 | PU58844-12 | CONNECTOR |
| CN11 | PU58844-6R | CONNECTOR |
| CN12 | PU58844-5 | CONNECTOR |
| CN13 | PU59513-12 | CONNECTOR |
| CN14 | PU58844-10 | CONNECTOR |

### - STEP BOARD ASSY<65> -

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| PWBA | PRK10095A2-01 | STEP BOARD ASSY |
| CN1 | PU58844-12 | CONNECTOR |
| CN2 | PU58844-4 | CONNECTOR |
| CN3 | PU60566-116 | CONNECTOR |

## TIMER BOARD ASSY <79>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| PWBA | PRK20141B | TIMER BOARD ASSY |
| IC1 | UPD75P218C-248B | IC |
| IC2 | M5278L56 | IC |
| IC3 | IC-PST523H-2 | IC |
| Q1 | 2SC3311A(RS) | TRANSISTOR |
| Q2 | DTC124EF | TRANSISTOR |
| Q3 | DTC124EF | TRANSISTOR |

# Thank you for purchasing the SA-K90E RS-232C interface board.

The SA-K90E is an RS-232C interface board designed exclusively for installation in the BR-9020E time lapse video cassette recorder.

To make the most of the SA-K90E's features and to ensure correct operation, please read this manual carefully.

COMPONENTS

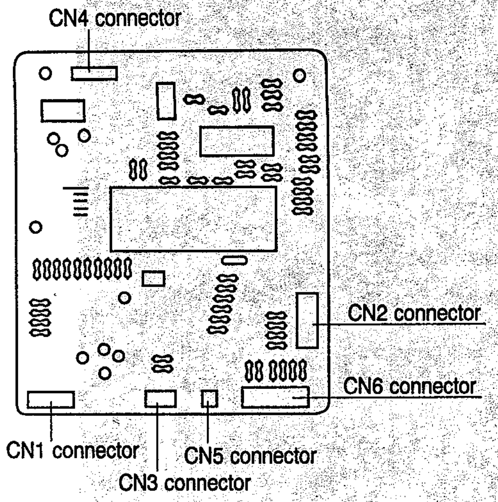
| | |
|---|---|
| RS-232C Board assembly | X1 |
| TERMINAL Board assembly | X1 |
| SCREW | X3 |
| BINDER | X1 |
| WIRE (with connector) | X2 |

CONTENS

1 CONNECTORS ........................................3
2 INSTALLATION IN VCR ..............................4
3 BR-9020E DIP SWITCH ..............................6
4 RS-232C PROTOCOL .................................7
5 Commands refarence chart ..........................8
6 COMMANDS AND CODES ...............................9
7 SPECIFICATIONS ...................................15

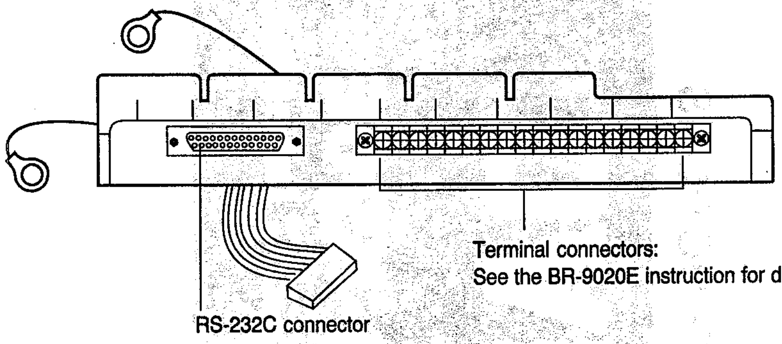
## 1 CONNECTORS

### RS-232C Board assembly



CN4 connector
CN2 connector
CN6 connector
CN1 connector
CN5 connector
CN3 connector

### TERMINAL Board assembly

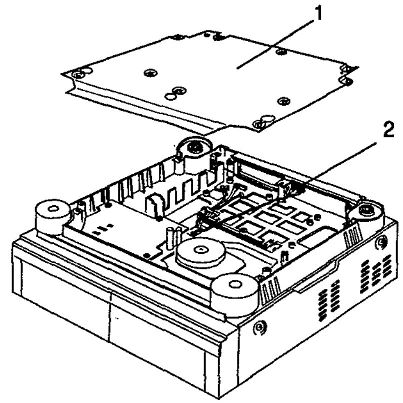


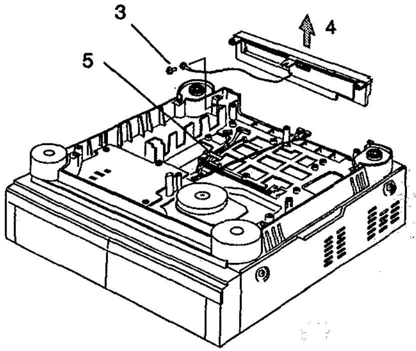
RS-232C connector

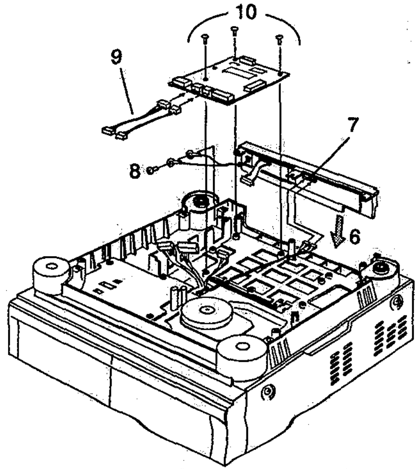
Terminal connectors:
See the BR-9020E instruction for details.

## 2 INSTALLATION IN VCR

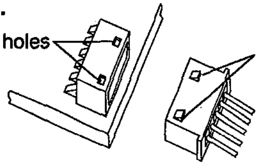
To install the SA-K90E, consult your JVC dealer.







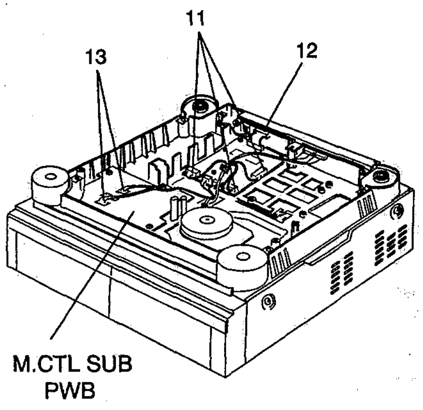
**Insert until the lugs are in contact with the holes.**



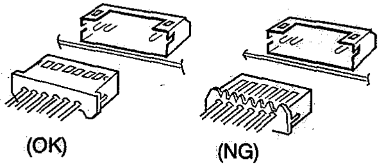
**Be sure to disconnect the VCR's power cable before installing the SA-K90E.**

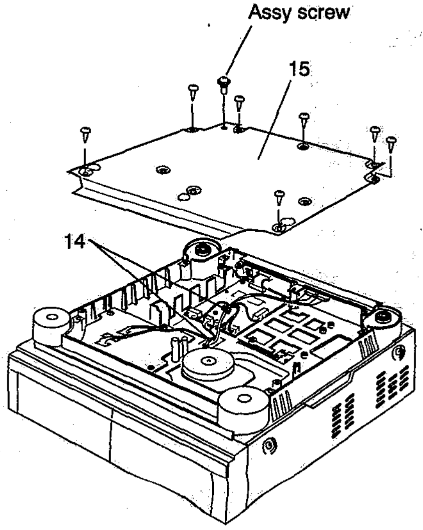
1 Unscrew the screws on the bottom cover and remove the cover.
2 Disconnect the CN1 (white) and CN2 (red) connectors from the terminal board assembly.
3 Remove the wire (black) with lug by unscrewing the screw. Do not drop the screw inside the unit or misplace the screw as it will be used again.
4 Remove the terminal board assembly from the VCR.
5 Remove the binder (bonding agent) attaching the wires to the VCR by cutting the connection.
6 Install the new terminal board assembly (with D-SUB port) in the VCR.
7 Insert the two wires disconnected in Step 2 into the CN1 and CN2 connectors on the new terminal board assembly. Match the colour of the wires with the colour of the connectors on the terminal board.
8 Connect the two wires (gray and black) on the terminal board with lugs to the bracket of the VCR using the screws removed in Step 3.
9 Insert the provided wires into the CN3 (red) and CN5 (white) connectors on the RS-232C board.
10 Attach the RS-232C board to the VCR with the provided screws. Be careful not to catch the wire between the chassis and the RS-232C board.
11 Insert the wires (green connector) that were disconnected from the binder in Step 5 into CN1 and CN6 on the RS-232C board, and insert the wire (yellow connector) into CN2 (yellow).
12 Insert the wire from the white connector (D-SUB CONN PWB) on the terminal assembly board into the CN4 (white) connector on the RS-232C board.
13 Insert the white and red wires connected to the RS-232C board in Step 9, into CN4 (pin 2) and CN5 (pin3) on the M.CTL SUB PWB.
14 Secure the wires using the wire clamp and the provided binder (bonding agent) at the position shown in the diagram.
15 Replace the bottom cover and secure with screws.Be careful not to catch the wire between the chassis and the bottom cover.

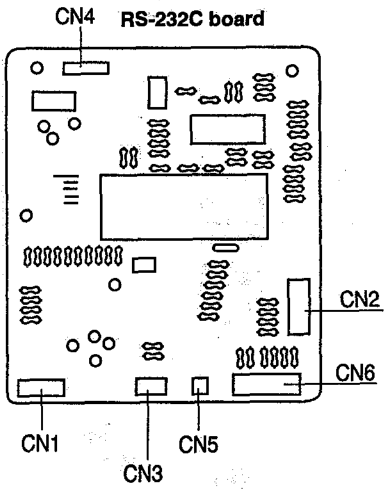
## 2 INSTALLATION IN VCR (continued)



How to connect to CN-1 and CN-6 on the RS-232C board







## 3 BR-9020E DIP SWITCH

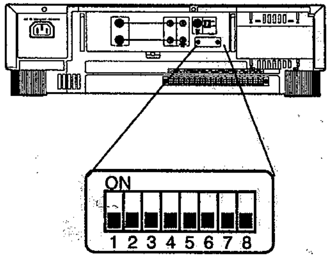
Be sure to turn the power off before setting.

1. Remove the cover on the VCR rear panel using a screwdriver.
2. Set to data rate.

| | Data rate (bps) | | | | |
|---|---|---|---|---|---|
| SW | 600 | 1200 | 2400 | 4800 | 9600 |
| 1 | ON | ON | ON | OFF | OFF |
| 2 | ON | ON | OFF | ON | OFF |
| 3 | ON | OFF | OFF | OFF | OFF |

SW4-8:NOT USED.
Factory preset:9600bps

VCR Rear panel



## 4 RS-232C PROTOCOL

### JVC BASIC TABLE & JVC TABLE 1

▨ The commands shown in the shaded area are effective exclusively for JVC Tbable 1. Before sending these commands, send the JVC TABLE 1 ON (F6h) command. This remains in effect until the JVC TABLE 1 OFF code (F7h) is set.

| | 0 | 3 | 4 | 5 | 6 | 7 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | Data "0" | ENTER | | TIMER ON | ON-SCREEN ON | | VISS FWD | | FRAME CODE (COUNT) | | |
| 1 | COMPLETION | Data "1" | CLEAR ERROR | | TIMER OFF | ON-SCREEN OFF | | VISS REV | REC CHECK | DEVICE TYPE | AL/PL RESET | |
| 2 | ERROR | Data "2" | | | PRG/ CLK | ROM VER. | | | | HOUR METER SENSE | COUNT | |
| 3 | CASSETTE OUT | Data "3" | | | SHIFT NEXT | POS V+ | EJECT | SEARCH (VISS) | | | | |
| 4 | | Data "4" | | | SHIFT BACK | ON-SCREEN SELECT | | | | | | |
| 5 | NOT TARGET | Data "5" | | | SET+ | POS H+ | | | | PL/AL COUNT SENSE | | |
| 6 | ALARM INPUT | Data "6" | | CLEAR | SET- | | | | | TL STATUS SENSE | | JVC TABLE 1 ON |
| 7 | | Data "7" | | | CANCEL | | | | | STATUS SENSE | | JVC TABLE 1 OFF |
| 8 | | Data "8" | | | REPEAT | | | | | | | |
| 9 | | Data "9" | | | OPE LOCK | | | | | | | |
| A | ACK | PLAY | REV PLAY | | ON OPE LOCK | | | | REC | | | REC/ DUB REQUEST |
| B | | | | | | POWER ON | FF | | REC PAUSE | | | |
| C | | | | | | POWER OFF | REW | | | | | |
| D | | | | | | MODE SHIFT | F-FIELD STEP | 1 SHOT INPUT | | | | |
| E | | | | | | MODE | | | | | | |
| F | | STOP | STILL | | | | | | | | | |

## 5 Commands refarence chart

### VCR control commands

| command | code | page |
|---|---|---|
| POWER ON | 7Bh | 9 |
| POWER OFF | 7Ch | |
| PLAY | 3Ah | |
| STILL | 4Fh | |
| STOP | 3Fh | |
| FF | ABh | |
| REW | ACh | |
| REV PLAY | 4Ah | |
| TIMER ON | 60h | |
| TIMER OFF | 61h | |
| OPE LOCK ON | 69h | |
| OPE LOCK OFF | 6Ah | |
| EJECT | A3h | |
| F-FIELD STEP | ADh | |
| 1 SHOT INPUT | BDh | |
| REC CHECK | C1h | |
| REC | CAh | |
| REC PAUSE | CBh | |
| REC/DUB REQUEST | FAh | |
| VISS FWD | B0h | 10 |
| VISS REV | B1h | |
| VISS SEARCH | B3h | |

### VCR setting commands

**1 Recording/playback mode setting commands**

| command | code | page |
|---|---|---|
| MODE SHIFT | 7Dh | 11 |
| MODE | 7Eh | |

**2 Clock setting/Timer programming commands**

| command | code | page |
|---|---|---|
| PRG/CLK | 62h | 11 |
| SHIFT + | 63h | |
| SHIFT - | 64h | |
| SET + | 65h | |
| SET - | 66h | |
| CANCEL | 67h | |
| REPEAT | 68h | |

**3 On screen setting commands**

| command | code | page |
|---|---|---|
| ON SCREEN ON | 70h | 11 |
| ON SCREEN OFF | 71h | |
| ON SCREEN SELECT | 74h | |
| POS V+ | 73h | |
| POS H+ | 75h | |

**4 Other commands**

| command | code | page |
|---|---|---|
| AL/PL RESET | E1h | 11 |
| COUNT RESET | E2h | |

### Commands for VCR status verification

| command | code | page |
|---|---|---|
| COUNT CODE | D0h | 12 |
| DEVICE TYPE | D1h | |
| VTR INQ | FBh | |
| PL/AL COUNT SENSE | D5h | |
| HOUR METER SENSE | D2h | |
| TL STATUS SENSE | D6h | |
| STATUS SENSE | D7h | |
| ROM VER. | 72h | 13 |

### Return codes from VCR

| command | code | page |
|---|---|---|
| ERROR | 02h | 14 |
| ACK | 0Ah | |
| NAK | 0Bh | |
| CASSETTE OUT | 03h | |
| COMPLETION | 01h | |
| NOT TARGET | 05h | |
| ALARM INPUT | 06h | |

### Other commands

| command | code | page |
|---|---|---|
| JVC TABLE 1 ON | F6h | 14 |
| JVC TABLE 1 OFF | F7h | |
| CLEAR ERROR | 41h | |
| CLEAR | 56h | |

## 6 COMMANDS AND CODES

### VCR control commands

Keep in mind that RS-232C control the VCR is not possible if the VCR's REMOTE/ LOCAL switch is set to LOCAL.
The VCR will return "ACK"(0Ah) when the commands are recieved. Confirm that "ACK" has been returned before transmitting the next command.

**POWER ON** **7Bh**
VCR power is turned "ON".

**POWER OFF** **7Ch**
VCR power is turned "OFF".

**PLAY** **3Ah**
Playback

**STILL** **4Fh**
Pause/Still

**STOP** **3Fh**
Stop

**FF** **ABh**
FF/Forward search in the Play mode.(VISS Search when the VISS switch is set to ON.)

**REW** **ACh**
REW/Reverse search in the Play mode.(VISS Search when the VISS switch is set to ON.)

**REV PLAY** **4Ah**
Reverse playback at normal speed

**TIMER ON** **60h**
Timer "ON"

**TIMER OFF** **61h**
Timer "OFF"

**OPE LOCK ON** **69h**
Operation lock "ON"

**OPE LOCK OFF** **6Ah**
Operation lock "OFF"

**EJECT** **A3h**
Cassette ejection
VCR returns "ACK", and then returns CASSETT OUT(03h) after cassette has been ejected.

**F-FIELD STEP** **ADh**
Engages frame/field advance when the VCR is in the Still mode. If the VCR is in any other mode, the Still mode is engaged. The tape is advanced by on field in the 2H/ Timelapse mode, and by one frame in the 6H mode.

**1 SHOT INPUT** **BDh**
Triggers one-shot recording when the VCR is in the One-shot recording mode.

**REC CHECK** **C1h**
Engages REC CHECK.

**REC** **CAh**
Starts recording.
Befor transmitting the following command, first transmit REC/DUB REQUEST(FAh), and confirm that "ACK" is returned by the VCR.
If the loaded cassette's safety tab has been removed, recording is not possible regardless of the fact that "ACK" has been returned.

**REC PAUSE** **CBh**
Engages Record-Pause mode.
Befor transmitting the following command, first transmit REC/DUB REQUEST(FAh), and confirm that "ACK" is returned by the VCR.
To re-start recording, transmit REC/DUB REQUEST(FAh) and REC(CAh).
To cancel Record-Pause, transmit STOP(3Fh).
If the loaded cassette's safety tab has been removed, recording is not possible regardless of the fact that "ACK" has been returned.

**REC/DUB REQUEST** **FAh**
Send this signal before sending the REC (CAh) or REC PAUSE (CBh) command. If this command and REC command are sent after the REC PAUSE command has been issued, the VCR's REC mode will be engaged.

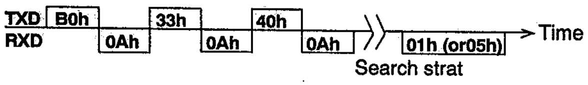
### VISS-related Commands

The following three commands are used together with numeric data. Data should be transmitted while confirming the ACK (0Ah) signal from the VCR.
ASCII codes "30h-39h" correspond with the numbers "0-9".
The VCR starts INDEX search after returning "ACK". When the specified point is reached, the VCR returns COMPLETION (01h). If the end or beginning of the tape is reached before the specified point, the VCR returns NOT TARGET(05h).

**VISS FWD** **B0h**
To advance the tape in the forward search mode to the designated alarm-input point. The alarm point's 1-byte numeric data and the data input command (40h) should be input after transmission of this command.

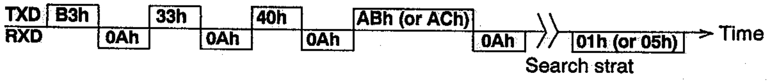
**VISS REV** **B1h**
To reverse the tape in the reverse search mode to the designated alarm-input point. The alarm point's 1-byte numeric data and the data input command (40h) should be input after transmission of this command.

Eg: To search for the 3rd alarm-input point from the current position.



**VISS SEARCH** **B3h**
To search for a designated INDEX point on the tape.The alarm point's 1-byte numeric data, the data input command (40h), and either FF(ABh) or REW(ACh) should be input after transmission of this command.

Eg: To search for the 3rd alarm-input point from the current position.



## VCR setting commands

Keep in mind that RS-232C control the VCR is not possible if the VCR's REMOTE/LOCAL switch is set to LOCAL.

**1 Recording/playback mode setting commands:**

**MODE SHIFT** **7Dh**
Switches from one recording/playback mode to the next each time the commands is transmitted. Use the TL STATUS SENSE(D6h) command to check the current mode.Transmit 1 byte at time with "ACK"(0Ah) confirmation from the VCR after each transmission.

**MODE** **7Eh**
Sets recording/playback mode directly. After transmitting this command, transmit the appropriate 2-byte ASCII codes (from 30h to 39h) and the data input command(40h). Correspondence of ASCII codes with recording/playback modes is as shown below.

1st/2nd byte:

| Mode | 1st byte | 2nd byte |
|---|---|---|
| 2H | 30h | 30h |
| 6H | 30h | 31h |
| 16H | 30h | 32h |
| 24H | 30h | 33h |
| 48H | 30h | 34h |
| 72H | 30h | 35h |
| 84H | 30h | 36h |
| 120H | 30h | 37h |
| 168H | 30h | 38h |
| 240H | 30h | 39h |
| 480H | 31h | 31h |
| 960H | 31h | 33h |
| 1 SHOT | 31h | 35h |

**2 Clock setting/Timer programming commands:**
Setting procedure is the same as when using the VCR controls. Be sure to transmit commands 1 byte at a time with "ACK" (0Ah) confirmation from the VCR after each transmission.

**PRG/CLK** **62h**
Engages clock setting mode and timer programming.

**SHIFT +** **63h**
Selects setting items.(+)

**SHIFT -** **64h**
Selects setting items.(-)

**SET+** **65h**
Sets data selected with SHIFT.(except recording mode).
Set the recording mode with MODE SHIFT (7Dh).

**SET -** **66h**
Sets data selected with SHIFT.(except recording mode).
Set the recording mode with MODE SHIFT (7Dh).

**CANCEL** **67h**
Cancels program data in timer programming or engages the Concel Program mode.

**REPEAT** **68h**
Selects daily or weekly repeat in timer programming.

**3 On screen setting commands:**

**ON SCREEN ON** **70h**
Activates time/data on-screen indication.

**ON SCREEN OFF** **71h**
Deactivates on-screen indication.
Be sure to transmit commands 1 byte at a time with "ACK" (0Ah) confirmation from the VCR after each transmission.

**ON SCREEN SELECT** **74h**
Selects on-screen setup page.

**POS V+** **73h**
Moves on-screen indication vertically.

**POS H+** **75h**
Moves on-screen indication in horizontally.

**4 Other commands:**

**AL/PL RESET** **E1h**
When transmitted during alarm recording, the recording mode switches back to the previous mode and "AL" indicator goes off. Transmit again to reset the alarm/power loss memory.

**COUNT RESET** **E2h**
Resets the tape counter to "0000".

## Commands for VCR status verification

The following commands are effective regardless of the setting of the VCR's REMOTE/LOCAL select switch.

**COUNT CODE** **D0h**

VCR returns the counter data beginning with the 4th digit from the right in 4 bytes. ASCII codes "30h-39h" correspond with the numbers "0-9"

**DEVICE TYPE** **D1h**

VCR returns the last 4 characters of the BR-9020 model name in ASCII code. 9:39h,0:30h,2:32h,0:30h

**VTR INQ** **FBh**

Used to make sure that the connected unit is the VCR. The VCR will return "ACK"(0Ah).

**PL/AL COUNT SENSE** **D5h**

VCR will return a total of 5 bytes. The first 3 bytes show the number of alarm inputs in 3 digits and the last 2 bytes show the number of power losses in 2 digits. ASCII codes "30h-39h" correspond with the numbers "0-9". (eg: 123 alarm inputs and 45 power losses:31h,32h,33h,34h,35h)

**HOUR METER SENSE** **D2h**

VCR returns the hour meter data in 4 bytes.(eg:1234 hours:31h,32h,33h,34h)

**TL STATUS SENSE** **D6h**

VCR returns Timelapse made data in 4 bytes. The contents of each byte are as follows:

1st/2nd byte:

| Mode | 1st byte | 2nd byte |
|---|---|---|
| 2H | 30h | 30h |
| 6H | 30h | 31h |
| 16H | 30h | 32h |
| 24H | 30h | 33h |
| 48H | 30h | 34h |
| 72H | 30h | 35h |
| 84H | 30h | 36h |
| 120H | 30h | 37h |
| 168H | 30h | 38h |
| 240H | 30h | 39h |
| 480H | 31h | 31h |
| *960H* | *31h* | *33h* |
| 1 SHOT | 31h | 35h |

3rd byte:

| Bit | Status when Bit is "1" |
|---|---|
| 0 | Next function memory mode |
| 1 | Power is ON. |
| 2 | Auto REC mode is ON. |
| 3 | Auto rewind mode is ON. |
| 4 | Operation lock is ON. |
| 5 | Series recording is in ON. |
| 6 | Tape end buzzer is ON. |
| 7 | Alarm buzzer is ON. |

4th byte

| Bit | Status when Bit is "1" |
|---|---|
| 0 | Alarm recording is in progress. |
| 1 | ALARM REC seitch is ON. |
| 2 | Not defined. Always 0. |
| 3 | Sensor recording is ON. |
| 4 | Not defined. Always 0. |
| 5 | Not defined. Always 0. |
| 6 | Not defined. Always 0. |
| 7 | Not defined. Always 0. |

**STATUS SENSE** **D7h**

The VCR will return current status information in 5 bytes.

1st byte

| Bit | Status when Bit is "1" |
|---|---|
| 0 | Error<br>Indicates that an illegal command has been received. No further commands will be accepted. To restore to normal operation, transmit CLEAR ERROR(41h) to the VCR. |
| 1 | Not defined. Always 0. |
| 2 | Not defined. Always 0. |
| 3 | Cassette out<br>The tape has not been loaded. |
| 4 | REC inhibit<br>A tape with no safety tab has been loaded. |
| 5 | Not defined. Always 0. |
| 6 | Not defined. Always 0. |
| 7 | Not defined. Always 1. |

2nd byte

| Bit | Status when Bit is "1" |
|---|---|
| 0 | Tape End<br>Tape end sensor is detected. |
| 1 | Tape Begin<br>Tape begin sensor is detected. |
| 2 | Not defined. Always 0. |
| 3 | Warning<br>VCR malfunction. |
| 4 | Not defined. Always 0. |
| 5 | Not defined. Always 0. |
| 6 | A EE Mode<br>An externally-input audio signal is begin output. |
| 7 | V EE Mode<br>An externally-input video signal is begin output. |

3rd byte

| Bit | Status when Bit is "1" |
|---|---|
| 0 | Not defined. Always 0. |
| 1 | Search Mode<br>Alarm Search is in progress. |
| 2 | Repeat Mode<br>Repeat recording/playback is in progress. |
| 3 | Not defined. Always 0. |
| 4 | Repeat<br>VCR's REPEAT REC/PLAY switch is set to ON. |
| 5 | Counter search<br>VCR's COUNTER MEMORY switch is set to ON. |
| 6 | Timer REC ON<br>VCR's TIMER button is set to ON. |
| 7 | Not defined. Always 0. |

4th byte

| Bit | Status when Bit is "1" |
|---|---|
| 0 | Not defined. Always 0. |
| 1 | REC Mode<br>VCR is in the Record mode. |
| 2 | Eject<br>A cassette is begin ejected. |
| 3 | Not defined. Always 0. |
| 4 | Stop Mode<br>VCR is in the Stop mode. |
| 5 | REW Mode<br>VCR is in the Rewind mode. |
| 6 | FF Mode<br>VCR is in the Fast Forward mode. |
| 7 | Play Mode<br>VCR is in the Play mode. |

5th byte

| Bit | Status when Bit is "1" |
|---|---|
| 0 | Speed Code 0<br>VCR's current tape running mode. See below. |
| 1 | Speed Code 1<br>VCR's current tape running mode. See below. |
| 2 | Speed Code 2<br>VCR's current tape running mode. See below. |
| 3 | Speed Code 3<br>VCR's current tape running mode. See below. |
| 4 | Shuttle REV<br>Reverse search is in progress. |
| 5 | Shuttle FWD<br>Forward search is in progress. |
| 6 | Not defined. Always 0. |
| 7 | Pause Mode<br>VCR is in the Pause mode. |

Contens of 5th byte Bit 0/1/2/3 "SPEED Code"

| Speed code<br>3 2 1 0 | Status |
|---|---|
| 0 0 0 0 | Still |
| 0 0 0 1 | Timelapse playback |
| 0 1 0 1 | Timelapse recording/<br>1Xplayback |
| 0 1 1 0 | Double-speed playback |
| 1 0 0 0 | 9X search |

**ROM VER.** **72h**

Return the current ROM version.

# 6 COMMANDS AND CODES (continued)

## Return codes from VCR

**ERROR** 02h

This is returned when commands of more than 1 byte are transmitted to the VCR and an illegal command is received in the 2nd byte (or later) of the transmitted command. In this status, no command can be accepted and only STATUS SENSE will be returned.

To restore normal operation, transmit CLEAR ERROR (41h) or CLEAR (56h) to the VCR.

**ACK** 0Ah

VCR will return this code when a command is received correctly.

**NAK** 0Bh

VCR will return this code when non-defined or non-functional command is received in the 1st byte of the transmitted command. In this case, it is not necessary to input CLEAR. Check whether the transmitted command is acceptable to the VCR or not.

**CASSETTE OUT** 03h

VCR will return this code when the cassette has been ejected following the EJECT command.

**COMPLETION** 01h

VCR will return this code upon detection of the target point requested by a VISS-related command.

**NOT TARGET** 05h

VCR will return this code when the end (or biginning) of the tape is reached before detection of the target point requested by a VISS-related command.

**ALARM INPUT** 06h

BR-9020E return code.

This is returned when an alarm signal is input during recording.

## Other commands

**JVC TABLE 1 ON** F6h

Makes JVC BASIC TABLE and JVC TABLE 1 commands available.

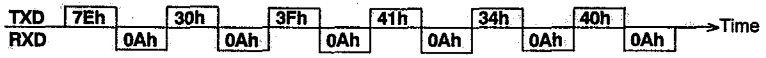
**JVC TABLE 1 OFF** F7h

Makes only JVC BASIC TABLE commands available.

**CLEAR ERROR** 41h

Used to cansel previously-transmitted 1 byte data when inputting numeric data such as an Index search point. Also used to cancel error status.

Eg:After setting the recording/playback mode to "48h", the numeric data (ASCII codes 30h-39h) is mistakenly transmitted as "3Fh". Cancel 3Fh with "41h" and input "34h" instead.



**CLEAR** 56h

Clear the whole command. Cancels the current status and stops the VCR. Also cancels the error status.

# 7 SPECIFICATIONS

**•RS-232C 25-PIN SERIAL REMOTE CONTROL INTERFACE**

| pin No. | Signal | Subject | Direction of signals |
|---|---|---|---|
| 1 | FG | FRAME GROUND | |
| 2 | TXD | TRANSMIT DATA | VCR → COMPUTER |
| 3 | RXD | RECEIVE DATA | VCR ← COMPUTER |
| 6 | DSR | DATA SET READY | VCR ← COMPUTER |
| 7 | GND | SIGNAL GROUND | |
| 20 | DTR | DATA TERMINAL READY | VCR → COMPUTER |

Output level- ON : more than +5V
OFF : less than -5V

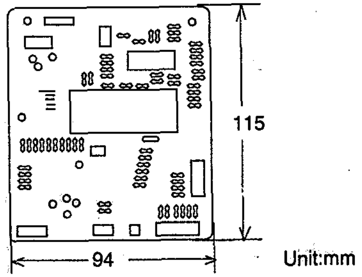
Use cross-type cable for connection with a computer.

DATA FORMAT
Mode : Non-synchronised
Charactor length : 8 bits
Parity check : None
Stop bit : 1 bit
Data rate : 600,1200,2400,4800,9600 bps
(Selectable with DIP switch setting. See page 6)

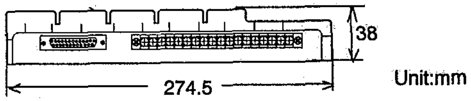
- **Power consumption** ............................ **0.5W**
- **Allowable operating temperatures** ...... **5°C~40°C**
- **Allowable storage temperatures** ......... **−20°C~60°C**
- **Allowable operating humidities** ........... **30%~60%**

**External dimensions**

RS-232C Board assembly



TERMINAL Board assembly



# SECTION 1
# DIAGRAM AND CIRCUIT BOARD

**Refer to the following items and pages of the service manual for the BR-9020E (No. 9302).**

| | |
|---|---|
| (1) SCHEMATIC DIAGRAM | Page 4-48, 50 |
| (2) CIRCUIT BOARD | Page 4-49, 50 |

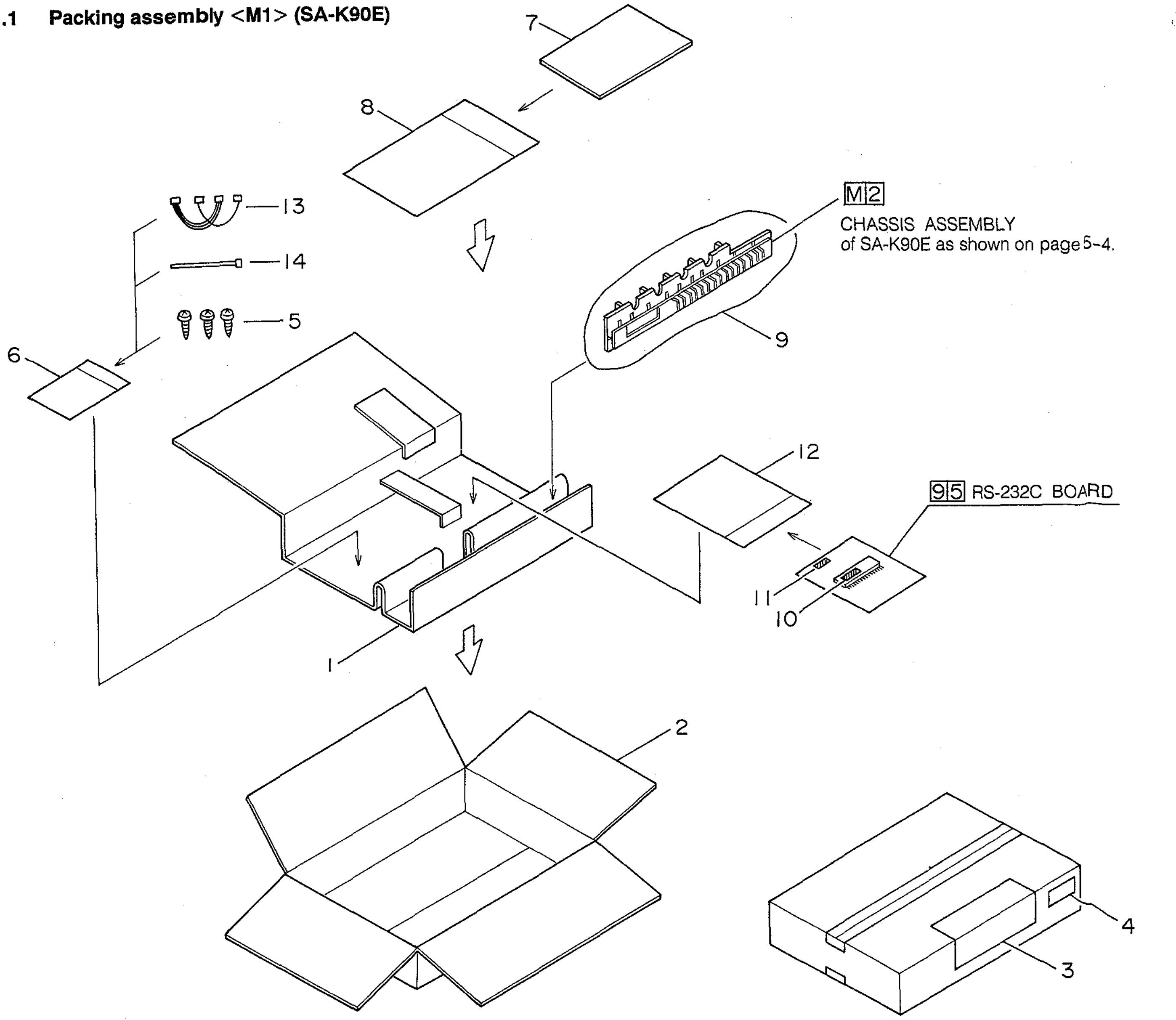
# SECTION 2
# EXPLODED VIEWS AND PARTS LIST

**SAFETY PRECAUTION**

**Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.**

## 2.1 EXPLODED VIEWS AND PARTS LIST

### 2.1.1 Packing assembly <M1> (SA-K90E)


7
8
13
14
5
6
M2
CHASSIS ASSEMBLY
of SA-K90E as shown on page 5-4.
9
12
95 RS-232C BOARD
11
10
1
2
4
3

********************************

**PACKING ASSEMBLY (SA-K90E) <M1>**

| #⚠ REF No. | PART No. | PART NAME, DESCRIPTION |
|---|---|---|
| 1 | PRD20514 | PACKING SHEET |
| 2 | PRD30094-02 | PACKING CASE |
| 3 | PRD30092-44-10 | PACKING LABEL |
| 4 | PUP40619 | SERIAL NO.STICKER |
| 5 | SDSF3008Z | SCREW, X3 |
| 6 | QPGA005-01010 | POLY BAG |
| 7 | SL96018 | INSTRUCTIONS |
| 8 | QPGA017-02505 | POLY BAG |
| 9 | QPGA012-03005 | POLY BAG |
| 10 | PRD30072-88 | STICKER |
| 11 | PRD30072-89 | STICKER |
| 12 | PRD30413-01-04 | AIR CAP BAG |
| 13 | ML-G01052C | WIRE ASSY |
| 14 | PU43192-4 | BINDER |

# SECTION 3
# ELECTRICAL PARTS LIST

## SAFETY PRECAUTION

**Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.**

[6][1] [9][5]

## D-SUB CONNECTOR BOARD ASSY <61>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| PWBA | PRK30047E | D-SUB CONNECTOR BOARD ASSY | |
| JP1 | QRSA08J-0R0Y | RESISTOR | 0Ω,1/10W |
| JP2 | QRSA08J-0R0Y | RESISTOR | 0Ω,1/10W |
| JP3 | QRSA08J-0R0Y | RESISTOR | 0Ω,1/10W |
| JP4 | QRSA08J-0R0Y | RESISTOR | 0Ω,1/10W |
| JP5 | QRSA08J-0R0Y | RESISTOR | 0Ω,1/10W |
| JP6 | QRSA08J-0R0Y | RESISTOR | 0Ω,1/10W |
| VA1 | PGZ00753 | VARISTOR | |
| VA2 | PGZ00753 | VARISTOR | |
| VA3 | PGZ00753 | VARISTOR | |
| VA4 | PGZ00753 | VARISTOR | |
| VA5 | PGZ00753 | VARISTOR | |
| CN1 | PU58844-9 | CONNECTOR | |

## RS-232C BOARD ASSEMBLY <95>

| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| PWBA | PRK20115C | RS232C BOARD ASSY | |
| IC1 | M50747E-2D1SP | IC | |
| IC2 | M50927E-258SP | IC | |
| | or M50927-258SP | IC | |
| IC3 | ICL232CPE | IC | |
| IC4 | TA78L005AP | IC | |
| IC5 | IC-PST523H-2 | IC | |
| IC6 | M6M80021P | IC | |
| Q1 | 2SD637(QR) | TRANSISTOR | |
| D1 | 1SS133 | DIODE | |
| D2 | RD7.5ES-T1B1 | ZENER DIODE | |
| R1 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R2 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R3 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R4 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R5 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R6 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R7 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R8 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R9 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R10 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R11 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R17 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R18 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R19 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R20 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R21 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R22 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R23 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R24 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R25 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R26 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R27 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R28 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R29 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R30 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R31 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R32 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R33 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R34 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R35 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R36 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R37 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R38 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R39 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R40 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R41 | QRD161J-105 | RESISTOR | 1MΩ,1/6W |
| R42 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R43 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R44 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R45 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R46 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R47 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R48 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R49 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R50 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R51 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R52 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R53 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R54 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R55 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R56 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R57 | QRD161J-223 | RESISTOR | 22kΩ,1/6W |
| R58 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R59 | QRD161J-222 | RESISTOR | 2.2kΩ,1/6W |
| R60 | QRD161J-470 | RESISTOR | 47Ω,1/6W |
| R61 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R62 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R63 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R64 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R65 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R66 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R67 | QRD161J-103 | RESISTOR | 10kΩ,1/6W |
| R68 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R69 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R70 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R71 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |
| R72 | QRD161J-102 | RESISTOR | 1kΩ,1/6W |

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| #⚠REF No. | PART No. | PART NAME, DESCRIPTION | |
|---|---|---|---|
| R73 | QRD161J-102 | RESISTOR | 1kΩ,1／6W |
| R74 | QRD161J-102 | RESISTOR | 1kΩ,1／6W |
| R75 | QRD161J-105 | RESISTOR | 1MΩ,1／6W |
| R76 | QRD161J-563 | RESISTOR | 56kΩ,1／6W |
| R77 | QRD122J-101 | RESISTOR | 100Ω,1／2W |
| R78 | QRD161J-0R0 | RESISTOR | 0Ω,1／6W |
| R80 | QRD161J-102 | RESISTOR | 1kΩ,1／6W |
| R81 | QRD161J-123 | RESISTOR | 12kΩ,1／6W |
| C1 | QCF31HP-223 | CAPACITOR | 0.022μF,50V |
| C3 | QCS31HJ-330 | CAPACITOR | 33pF,50V |
| C4 | QCS31HJ-330 | CAPACITOR | 33pF,50V |
| C5 | QEE81CM-226 | TANTAL CAPACITOR | 22μF,16V |
| C6 | QEE81CM-226 | TANTAL CAPACITOR | 22μF,16V |
| C7 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C8 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C9 | QER41CM-226 | E CAPACITOR | 22μF,16V |
| C10 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C11 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C12 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C13 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C14 | QCF31HP-103 | CAPACITOR | 0.01μF,50V |
| C15 | QER61CM-226 | E CAPACITOR | 22μF,16V |
| C16 | QER61CM-106 | E CAPACITOR | 10μF,16V |
| L1 | PU48530-101J | COIL | 100μH |
| X1 | PGZ00157 | CRYSTAL RESONATOR | |
| X2 | PU60030 | RESONATOR | |
| | or PU60782 | RESONATOR | |
| TH1 | PU52108-100K | POSITIVE THERMISTOR | |
| SKT1 | PGZ01957-064 | IC SOCKET, FOR IC1 | |
| TP1 | PU54983 | TEST PIN, ×4 | |
| CN1 | PU59555-109 | CONNECTOR | |
| CN2 | PU58844-110Y | CONNECTOR | |
| CN3 | PU58844-105R | CONNECTOR | |
| CN4 | PU58844-9 | CONNECTOR | |
| CN5 | PU58844-102 | CONNECTOR | |
| CN6 | PU59555-106 | CONNECTOR | |